# Montana Outdoors

May–June 2005

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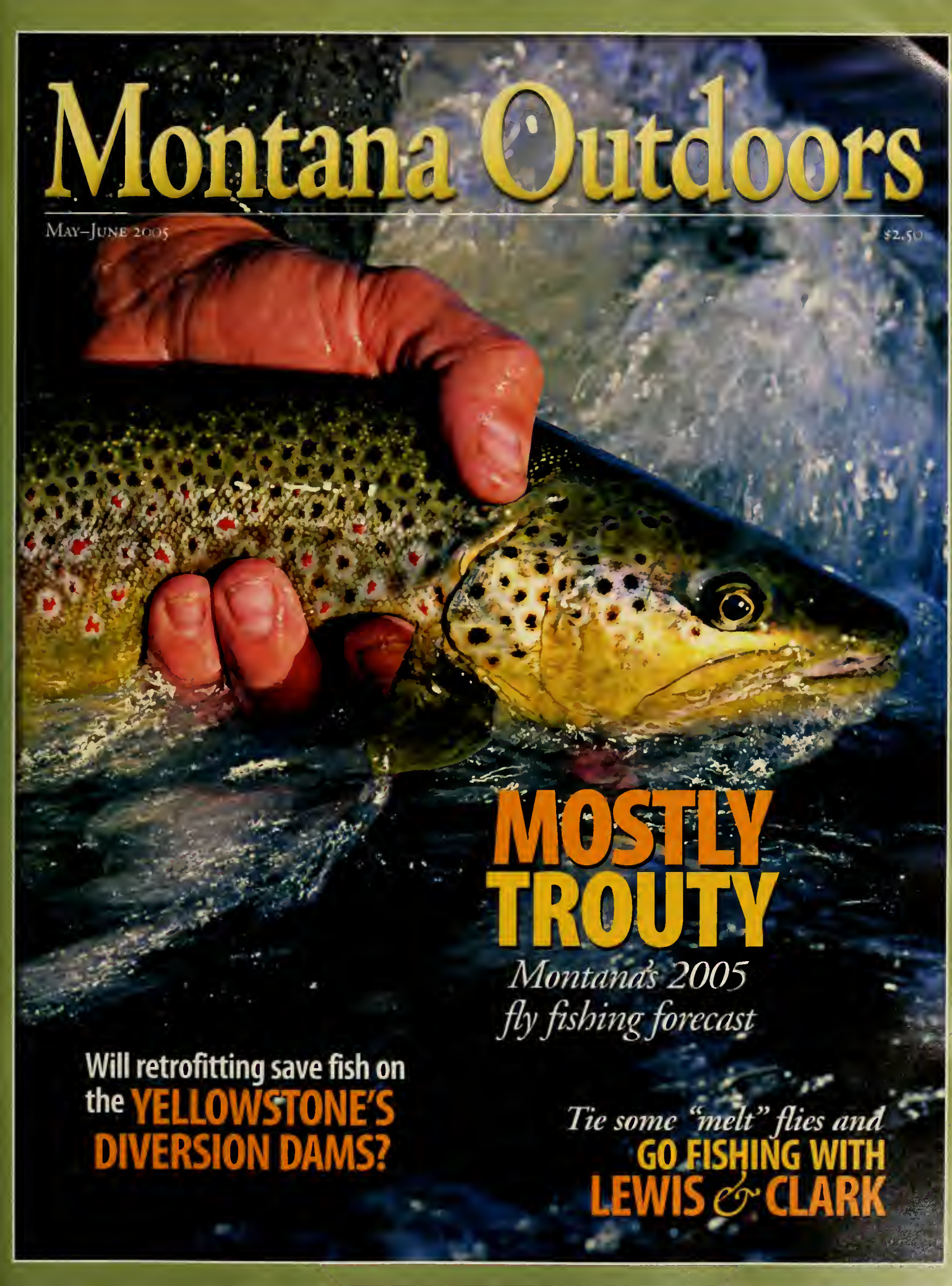

## MOSTLY TROUTY

*Montana's 2005 fly fishing forecast*

Will retrofitting save fish on the YELLOWSTONE'S DIVERSION DAMS?

*Tie some "melt" flies and* GO FISHING WITH LEWIS & CLARK

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**OPPOSITE PAGE:** *An airborne trout lands with a splash on the Yellowstone River. Did the Lewis and Clark Expedition have similar angling action in Montana 200 years ago? Find out beginning on page 18. Photo by Denver Bryan.*

**COVER PHOTO:** *Brown trout were first stocked in Montana in 1889 (the Madison River). Check out the 2005 fishing forecast for browns and other trout starting on page 6. Photo by Dušan Smetana.*

## Don't let bison expand

Your bison article ("Buffaloed," November–December 2004) could have said more about Yellowstone National Park (YNP) bison continuing to increase beyond the range carrying capacity. The National Park Service seems oblivious to the loss of wildlife and vegetation diversity from range abuse, including soil erosion. Beyond the borders of YNP, organizations now want to add new bison to the landscape. That would require fencing, and we already have problems with domestic bison fences entangling elk, moose, and bighorn sheep.

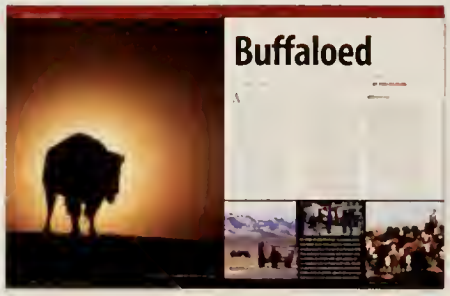
The Unlawful Inclosures Act of 1885 "guarantees free access to and from public lands for wildlife." This federal law, which has far-reaching implications, was recently challenged in Wyoming and Arizona. Federal courts ruled in favor of wildlife and ordered barrier fences to be removed or modified.

Montana must look closer at the legal and biological implications to native big game of adding bison herds to the landscape. A logical alternative is to use hunting to manage the bison now entering Montana from YNP.

Jack D. Jones
*Butte*

## Control bison numbers

I was raised in Livingston and knew Yellowstone National Park like the back of my hand. I moved away and, 30 years later, recently returned to the park. As I drove around, I was astonished how many buffalo there were. Every turn in the road led us to another field with herds of buffalo. Something inside of me said, "Too many." Then I started reading in *Montana Outdoors* about the great bison debate. Should there be controlled bison




kills? I say yes. It's obvious to me that what we're seeing, as bison try to get out of the park and spread out, is that they want space. Put any critter in a confined area and it will outgrow its domain. Let's thin out the herds before they starve and die.

Julie M. Hollar
*Choteau*

## Only in Montana

Mark Henckel's fine piece "Gateway to Fort Peck Lake" (March–April 2005) brought back many fond memories. In the mid-1940s, I was a fishing-crazed Glendive teenager who fished the Rock Creek area of the lake as often as I could. Back then, Rock Creek was utterly desolate, devoid of any structures though thick with rattlesnakes, rocks, and dirt.

Nevertheless, my family camped there, and we shore fished for sauger, rainbow trout, ling (which we foolishly threw back), and enough perch to fill a washtub.

The old Rock Creek dirt road (now abandoned) would become a gumbo quagmire should anybody even spit on it. In 1945, just a mile or so from our favorite campsite, my father slid off the slimy road during a light sprinkle. He and I had to hike some 12 miles back toward Jordan before we saw the lights of Elmer Trumbo's ranch in the growing darkness. Elmer took us back on his tractor and, with considerable difficulty, managed to get our car back on the road. For all that, he reluctantly accepted $5 from my father.

Exactly fifty years later, I read Dayton Duncan's delightful book *Miles from Nowhere* describing his visits to every county in the United States that had a population of less than two people per square mile. To my pleasant surprise, he mentioned meeting a rancher named John Trumbo in Montana's Garfield County just north of Jordan, which Duncan said was perhaps the most desolate county seat in the country. (Coincidentally, this is the same Duncan who wrote "Lewis and Clark in Montana," also in your March–April issue.)

After reading that book, I called John Trumbo, who turned out to be Elmer's son. That contact provided me and two cousins with an extraordinary opportunity to hunt with John's gregarious son, Mike, several times in the late 1990s. Visiting with John and Mike bolstered the strong feelings I'd long had for the Trumbo family. Only in Montana can you meet such fascinating, hard-scrabble tough, yet obliging people.

Bud Klecker
*Garden Grove, California*

## Another great mind

I enjoyed the cartoon of birds visiting a McDonald's birdhouse in the July–August 2004 issue. Apparently, great minds think alike. A few years ago, I decided to create a fly using the colors of McDonald's restaurants. I figured if that food was good enough for me, it was probably good enough for trout. Enclosed is the fly I designed and tied.

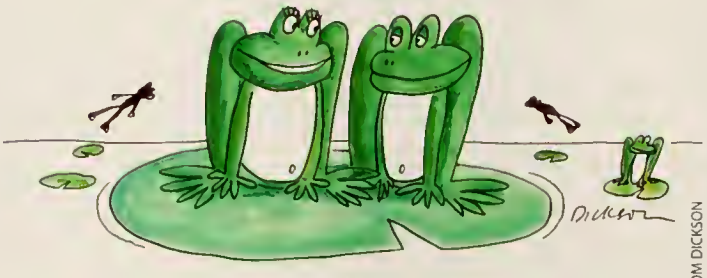
The sign is a painted coffee stir stick glued to the back of a dry-fly hook. The dubbing is yellow angora, and the hackle is red hen's cape. Last year my dad and I had a successful week fly fishing in the Missoula area. Believe it or not, we didn't even need to use my McDonald's fly.

Richard Yamarone
*Maplewood, New Jersey*

## Continuous parade

With all due respect to FWP Parks chief Doug Monger, I suggest he check out the Missouri River between Toston and Townsend to find out where all those canoes and kayaks he mentions seeing atop cars are ending up ("Paddling Montana," March–April). As a longtime riverside resident, I have seen the number of canoes and other watercraft passing my door increase from just a handful in 1978 to a continuous parade today. One would think free beer was being offered at the Indian Road Campground take-out point near Townsend.

John L. Stoner
*Townsend*




*"That is so cool! I'm into hip-hop too!"*

# Happy 35th!

The first issue, 1970.

In this fast-changing world, it's good to know some things stay the same. One of those is *Montana Outdoors*, which is celebrating its 35th anniversary this year.

What was then called the Montana Department of Fish and Game launched this magazine back in 1970. Since then, *Montana Outdoors* has covered all the state's major conservation issues, from coal mining and trout stocking to bison hunting and endangered species recovery.

The magazine's origins actually date back to 1928, when the Department of Fish and Game began publishing *Montana Wild Life*. As is still true today, Montana's fish and wildlife resources back then were too vast for the agency to manage alone. Only with cooperation from ranchers, hunters, and anglers could it conserve habitat, reduce depredation, enforce regulations, and otherwise manage fish and wildlife. For that to happen, however, citizens needed good information about fish and wildlife management.

In the first issue of *Montana Wild Life*, Thomas Marlowe, chair of the Fish and Game Commission, wrote, "We have found that where public dissatisfaction exists regarding activities of this department, much, if not all of it is based upon misinformation rather than the actual facts."

*Montana Wild Life* was discontinued in 1934. But within a few years, the department began publishing the *Montana Wildlife Bulletin*. That was replaced in the 1950s and '60s with a quarterly magazine called *Montana Wildlife*. The title *Montana Outdoors* was given to a monthly newsletter begun in 1966. Four years later, the department merged the newsletter and the quarterly magazine to create the publication you hold in your hands.

The tone of *Montana Outdoors* has changed over time, reflecting changes in Montana and this agency. In its first several years, the magazine ran fiery editorials denouncing the proposed Allenspur Dam, subdivision sprawl, and strip mining. In the 1980s and '90s, *Montana Outdoors* advocated for conservation by focusing more on the state's natural beauty and the personal satisfaction that comes from hunting, fishing, and camping in the outdoors. In recent years, as controversies over river recreation, endangered species, elk management, and other topics have inflamed public passion, *Montana Outdoors* has devoted considerable space to objective reporting on these and other topics. Like the piece on Yellowstone diversion dams in this issue ("Little Dams, Big Barriers," page 12), these articles present several sides to issues, allowing readers to make up their own minds about what needs to be done to solve problems affecting the state's environment, recreation, communities, and economies.

Over the years, *Montana Outdoors* has adjusted its approach to promoting conservation. It has altered its appearance, too, becoming livelier and more colorful. But one thing that has not changed is the magazine's primary purpose, which Marlowe identified back in 1928: "We need to disseminate authoritative information regarding activities of the department to present the facts, secure in the knowledge that authentic statistics have an educational value appreciated by [those] who love the out-of-doors."

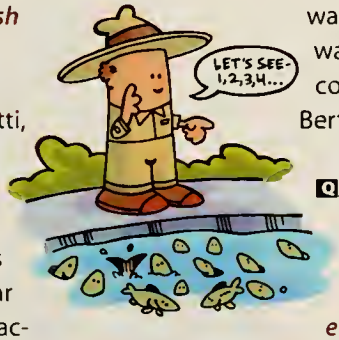
This department continues to believe that the more people know about what we do, the more likely they will work with us to conserve Montana's increasingly valuable fisheries, wildlife populations, and state parks. I hope *Montana Outdoors* continues to help with that effort for at least another 35 years.

—M. Jeff Hagener *Director, Montana Fish, Wildlife & Parks*

## NATURAL WONDERS

**Q.** *How many fish does FWP stock each year?*

**A.** Gary Bertellotti, FWP hatchery supervisor in Helena, says the figure varies from year to year depending on factors such as egg-taking conditions in Fort Peck Lake and other waters. "But generally, we rear and stock around 8 million trout and salmon annually and between 45 and 85 million fish, warmwater and coldwater species combined," Bertellotti says.




**Q.** *What percentage of elk hunters shoot a bull elk each year?*

**A.** Despite what you might think from reading hunting magazines, relatively few elk hunters bag a bull elk. The overall success rate on bulls, cows, and calves combined for elk hunters in 2003 was roughly 25%. Of the 29,000 elk killed, 13,700 were bulls, making the success rate for bulls slightly less than 12%. Most of those bulls were spikes and raghorns.

**Q.** *While visiting relatives in Plentywood, we saw a bright green snake roughly 2 feet long. What could it have been?*

**A.** You were lucky to have seen a smooth green snake, one of Montana's rarest reptiles. Found mainly in meadows, where it blends in with green grasses, the smooth green snake hides under logs, boards, and rocks, feeding mainly on insects.

Wonder about some part of Montana's natural world? E-mail us at: tdickson@mt.gov.

ILLUSTRATIONS BY PETER GROSSHAUSER

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Among the birds being celebrated at Montana birding festivals is the Townsend's solitaire, which nests in mountainous forests.

## Celebrating the Bird

According to the U.S. Fish and Wildlife Service, bird watching is the nation's fastest-growing outdoor activity, and Montana has the highest per capita number of birders in the country.

No wonder bird festivals are popping up all over the Treasure State. Held in areas with high and diverse bird concentrations during times when birds are their most colorful, the festivals are great places to learn about bird watching. Here are the main festivals being held during the next few months, according to Montana Audubon. Festivals include seminars, self-guided tours, and banquets. Because field trip space is often limited, call ahead to sign up:

■ **Bigfork:** June 3–5, (406) 443-3949. The Flathead Birding Festival features field trips around Flathead Lake and at the Ninepipe National Wildlife Refuge, National Bison Range, and Glacier National Park.

■ **Glasgow:** June 10–12, (406) 228-2222. Likely sightings at Glasgow's Feather Fest are the McCown's longspur, mountain plover, Sprague's pipit, long-billed curlew, sage grouse, and Le Conte's sparrow. A festival highlight is a birding field trip to Westby, warbler capital of Montana (see this issue, page 17).

■ **Stevensville:** June 17–19, (406) 777-5552, ext. 203. The Bitterroot Birding Festival centers on the Lee Metcalf National Wildlife Refuge, home to dozens of bird species, and the bird-rich Bitterroot National Forest. One of many festival events will be the inauguration of a new 25-stop birding route along the valley floor, the first link of a proposed statewide birding and nature trail.

## Lewis and Clark Road Show to Stop at Giant Springs

NPS

A National Park Service interpreter entertains Corps II visitors from a replica of a Corps of Discovery keelboat.

Wondering how best to commemorate the Lewis and Clark Bicentennial this year? One fun option is to visit a new traveling exhibit stopping at several Montana locations this summer.

Sponsored by the National Park Service, the Corps of Discovery II road show features Lewis and Clark maps, artifacts, journal entries, and natural history displays. The main exhibit is the Tent of Many Voices, a 150-seat auditorium featuring cultural arts demonstrations, folklore, music, and living history presentations.

Much of the exhibit focuses on American Indian tribes who helped the Lewis and Clark Expedition make it to the Pacific Ocean and back.

The traveling exhibition began in 2003 and continues through 2006, stopping at significant points along the Lewis and Clark Trail. Two featured stops this summer will be at Fort Benton and Great Falls, as part of that region's month-long Lewis and Clark Bicentennial Signature Event. From June 25 through July 4, the Corps of Discovery II exhibit will be stationed at Giant Springs Heritage State Park (see our park profile on page 32). Park manager Matt Marcinek says the park will make a great starting point for those wanting to commemorate the Lewis and Clark Expedition.

"You can also visit the Lewis and Clark National Historic Trail Interpretive Center just down the road, exhibits and presentations at [nearby] Ulm Pishkun State Park, and, of course, Giant Springs Heritage State Park," he says.

The traveling exhibit's 2005 Montana itinerary:

■ **May 6–9** Wolf Point (Fort Peck Reservation)
■ **May 14–17** Glasgow (Fort Peck Reservation)
■ **May 24–27** Malta (Fort Belknap Reservation)
■ **June 3–12** Fort Benton
■ **June 17–20** Box Elder (Rocky Boy's Reservation)
■ **June 25–July 4** Great Falls
■ **July 9–17** Helena
■ **July 22–31** Bozeman
■ **August 5–8** Dillon
■ **August 13–21** Salmon, Idaho
■ **September 8–11** Lolo

For more information, see the National Park Service website at lewisandclarkgnet.org.

## Do the State Park TWIST

*Fun things you never expected to do in Montana's state parks*

**Dancing with Ghosts**

A visit to Elkhorn State Park, near Boulder, takes you to one of Montana's most famous ghost towns. This 19th-century mining town's centerpiece is Fraternity Hall (below, at right, next to Gillian Hall), which is recorded with the Historic American Buildings Society. The elegant wooden hall once hosted plays, boxing matches, and colorful dances. One story has it that a man shot and killed another there while arguing over which tune the orchestra should play. Elkhorn is located 50 miles northeast of Butte, on a dirt road off Montana Highway 69.

TRAVEL MONTANA

Below: The Corps of Discovery II exhibit rolls into Great Falls on June 25 and stays through the Fourth of July. To see video clips of Corps II events and exhibits, including presentations from the Tent of Many Voices, go to lewisandclarkgnet.org.

NPS

# Surviving a bear encounter

Most advice concerning interactions between hikers and bears aims at preventing problems: Make noise and be alert while hiking, hike in groups, keep a clean camp, store food and trash 10 feet off the ground, and so on.

But what do you do if you actually encounter a grizzly or black bear, or in the extremely rare event of a bear attack?

Every bear encounter is different, and no advice can guarantee your safety. However, these guidelines developed by some of North America's most authoritative bear experts could help:

The first step is to determine whether a bear is acting defensively or offensively. That's the advice from the Alaska Interagency Bear Safety Education Committee. These bear experts say a *defensive* bear is one you have surprised, which can elicit an extremely rapid attack. If such a bear strikes or bites, you should drop to the ground (keeping your pack on), lie flat, and protect your head and neck. Continue to play dead until the bear leaves.

You encounter this. Now what?

An *offensive* bear is one that appears to be stalking or moving purposefully toward you, or has come into camp at night. In these extremely rare cases, say bear experts, make loud noises and wave your arms *before* the bear makes contact. If the bear does strike or bite, aggressively fight it off with any means at your disposal.

Guidelines based on the distance between you and a bear have been devised by Bill Schneider, Helena author of *Bear Aware* and *Where the Grizzly Walks.* Schneider developed them with Steve Herrero, professor emeritus at the University of Calgary and project leader for the Eastern Slopes Grizzly Bear Project. Schneider and Herrero stress the importance of determining whether a bear is acting defensively or offensively, as explained above. They also point out that staying calm is probably the best way to avoid injury. Their other guidelines:

**1. Bear at a distance:** If you see a bear far off, stop moving toward the bear. Slowly return down the trail the way you came for at least 400 yards until the bear is out of sight. Then, either use another trail or wait 20 minutes before hiking back up the original trail, making lots of noise.

**2. Bear on or near the trail:** "Stand your ground and take out your bear pepper spray," says Schneider, who, like many bear authorities, advises hikers and campers in bear areas to keep a canister of approved bear pepper spray accessible at all times. While continuing to face the bear, slowly back away until it is out of sight. Continue back down the trail for at least 400 yards. Then either consider another route or follow the advice in number 1.

**3. Bear at close range:** "The most important thing is to not panic, run wildly, or scream," says Schneider. "That could cause a bear to charge." Instead, stand still and be quiet. Get your pepper spray ready. If the bear does not move closer, it probably isn't aggressive, but stay put until you are sure. If the bear is not acting aggressively, slowly back away, talking to it quietly in a monotone voice. "Don't turn your back on the bear, run, kneel down, or make eye contact," says Schneider. "As you back up, slowly move your arms up and down, like jumping jacks without the jumping."

**4. Charging bear:** Again, don't panic. "Many charges are actually bluffs," says Schneider. "The grizzly just wants to scare you. Have your pepper spray ready, but don't spray unless the bear is within range." If the bear charges then stops, follow the advice in number 3, slowly backing away. If the bear doesn't stop, use the pepper spray. If that doesn't work, then you need to either play dead (defensive bear attack) or aggressively fight back (offensive bear attack).

Clip and Save

GRIZZLY PHOTO BY JUSTIN HORROCKS

MONTANA'S

# Fly Fishing Forecast

**Though ongoing drought has hurt some Montana trout fisheries, the outlook for 2005 on most major rivers looks good**

By Greg Thomas

Anglers are either pessimists or optimists, and these days it's easy to distinguish their affiliation. It seems everyone in Montana with a stake in fishing has an opinion about the prolonged six-year drought and how it affects the state's top trout fisheries.

On the one extreme are anglers who recall the glory days of abundant water and swollen trout populations in the 1990s. They say drought has atrophied rivers and decimated trout populations to the point where some waters no longer merit an angler's time. In contrast, some fly shop owners and guides are telling prospective clients that the fishing on local waters has never been better, seemingly ignoring the obvious.

No matter which camp you belong to, there's no denying that the drought has changed the face of Montana's fishing scene. But not necessarily all for the worse.

For example, though overall trout populations on some rivers have declined, the average size of those fish has risen. Where streams have seen changes in hatch timing and density, anglers may see fewer but more intense hatches than in years past. Also, drought has diminished the length and severity of spring runoff, which means more fishable days in April, May, and June when Skwala stoneflies and salmonflies emerge.

Despite those occasional benefits, the drought has definitely harmed many trout fisheries and continues to jeopardize fishing seasons on many waters. Some river levels have dropped alarmingly low in midsummer, while water temperatures have risen dangerously high. Anglers should check for emergency closures before visiting any Montana streams this season.

Here's a look at Montana's major trout streams and how they are being affected by the current drought, with notations on what anglers may expect there during the 2005 summer and fall seasons.

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**DESPITE THE DROUGHT** Yes, Montana is in its sixth year of drought, snowpack in some regions was far below normal, and the lack of water is harming some trout fisheries. But Montana is still the nation's top state for trout fishing opportunities. The Madison, for example (far left), is fishing extremely well due to healthy trout numbers and steady water flows from Hebgen Reservoir. Cutthroat fishing on the Gallatin (above) continues to be strong, as is the rainbow fishing on the Missouri below Holter Dam. One effect of the low and warm water in some rivers is that anglers may have to pay more attention to fly selection (left).

## Bighorn River

Anglers agree that the drought-stricken Bighorn isn't the trout stream it used to be. What they can't seem to agree on is whether the 'Horn is actually a better fishery now than it was during the 1990s, when it offered more than 6,000 mature trout per mile and several national sporting publications labeled it America's best trout stream.

While the Bighorn's trout population has diminished significantly, the river has an abundance of large trout— "the healthiest we've ever seen," says Ken Frazer, Montana Fish, Wildlife & Parks fisheries biologist in Billings.

"People who are used to catching 30 fish a day on the Bighorn just aren't going to do that right now," Frazer says. "But the fish they catch will be in terrific shape."

By that Frazer means big, fat, and strong. While the number of large trout in the Bighorn has grown, the river's aquatic insect hatches and the opportunity those insects provide for fantastic summer dry-fly fishing have diminished.

"I think it's the siltation of the river that has really put a dent in our PMD (pale morning dun) and *Trico* hatches," says Duane Schreiner, who runs Bighorn Fly and Tackle in Fort Smith. "We used to see the highest angling pressure in July and August. Now our best dry-fly fishing and our busiest time on the river runs from mid-April through May, when people are matching *Baetis* and midges."

Though anglers find good surface options during spring, they may have to probe under the surface in summer and early fall to find fish. Many of the river's mature trout take advantage of the river's crustacean smorgasbord, courtesy of the increased siltation caused by a lack of strong current. (Historically, spring floods flushed sediment from the river bottom.)

"Siltation has been a boon to scuds and sow bugs," Schreiner adds. "My theory is that a trout getting hit in the face with a protein shake every few seconds has no reason to go up top and risk its life for a caddis or mayfly. That hurts the dry-fly fishing."

No matter when you fish the Bighorn, you're likely to find fewer anglers than in past years. According to Bob McFarland, who monitors statewide angling activity for FWP, pressure on the Bighorn dropped from a high of 116,000 angler-days in 1999 to 81,000 in 2003—a trend that doesn't look to change any time soon.

## Big Hole River

Anglers who plan to hit the Big Hole this summer or fall may want to concentrate on the river's middle section between Wise River and Divide, where water conditions and rainbow trout populations are consistent.

"The rainbow trout stronghold is above Divide," says Dick Oswald, FWP biologist in Dillon, though he adds that the Melrose area also has good numbers of mature rainbows. "There are canyons between Wise River and Divide, lots of tributaries, and little irrigation withdrawal. The flows and water temperatures hang in there a little better than in other places. The aquatic system, including macroinvertebrates, is functioning better there than anywhere else on the Big Hole."

Browns, once abundant in the lower Big Hole, have declined. Anglers still find some browns below Glen, but not in the numbers or sizes they previously encountered.

"Our browns are the hardest hit from this drought," Oswald says. "In the Maiden Rock

FLY PHOTOS BY TED FAUCEGLIA

TIPS FOR 2005 TROUT

Experts predict the Yellowstone, which fares well in drought, should again produce some great 'hopper action (above). On the Kootenai River (near right) anglers will be looking for high spring flows to reduce floating mats of algae. On the Big Hole (far right) fish the deep canyon stretches where shade helps trout beat the summer heat.

slot-limit area, we recorded the lowest density of 18-inch-and-larger brown trout since special regulations went into place in 1981. Between Glen and the Notch Bottom Fishing Access Site, we've seen an 80 percent decline in the number of fish 18 inches and larger."

The best fishing on the Big Hole this year will be in June, during salmonfly and PMD hatches, or during fall when water temperatures cool and *Baetis* and *Trico* mayflies bring fish to the top.

## Kootenai River

This big river's rainbow population is at least stable and may be increasing, say FWP biologists, and the average size may be growing. But the fishing for those trout is dictated by water flows, determined by releases from Libby Dam. Because no one can predict more than a few days ahead of time what those flows will be, Mike Hensler, FWP biologist in Libby, recommends that anglers planning a trip to the Kootenai call local fly shops before heading to the river.

"What wade anglers like best are flows around 4,000 cfs (cubic feet per second)," he says. "What the float anglers seem to prefer are flows from 8,000 to 9,000 cfs. That opens up more areas for boats, but makes it tougher for wading."

Hensler adds that a big concern now on the Kootenai is the growing amount of a gelatinous algae. "If we see a constant low flow through the season, anglers will be dealing with growing amounts of algae that attaches to rocks and can form large, dense mats," he says. "The algae gets on leaders and makes nymph fishing difficult."

Hensler adds that last year many anglers complained that fishing was tough early in the season. "But as we got into summer and fall, fishing and catching improved considerably," he says. "Given decent flows, I'd expect to see that again."

## Madison River

The word is definitely out that the Madison is fishing well despite the prevalence of whirling disease. The "50-mile riffle" holds an abundance of rainbow and brown trout ranging between 16 and 18 inches, and these fish are fat and willing takers. What's more, the Madison is fed a constant supply of water from Hebgen Reservoir, making it one of the most dependable rivers in southwestern Montana.

That said, anglers should expect lots of fishing pressure in June, July, and August. In recent years, the Madison has become the most heavily fished stream in the state, and its trout are acting like they resent the fly fishing armada. Last year, local anglers and guides alike reported skeptical fish and lots of boat traffic.

According to Arrick Swanson, who runs Arrick's Fly Shop in West Yellowstone, anglers found fishing on the Madison more challenging last year than the year before, requiring more exact presentation. "It seems like I'm selling more small flies for the Madison these days," he says. "Is that because the fish are becoming more conscious of anglers, or is it related to certain water conditions? It's a debate around here."

As in most rivers, the crowds begin to thin in September. October and early November typically offer perfect conditions and solid *Baetis* and mahogany dun hatches.

*Greg Thomas, of Ennis, is author of several western fly fishing guides and* Tight Lines, *a yearly Rocky Mountain fly fishing forecast.*

## Bitterroot River

The Bitterroot is surviving Montana's brutal drought as well as any stream in the state, thanks to some well-timed summer rains and timely, controlled flows from Painted Rocks Reservoir.

Anglers, biologists, and guides report a steady increase in cutthroat and rainbow trout populations. Average size is increasing, too, and aquatic insect hatches are better than ever. Offering solid hatches of PMDs, caddis, golden stoneflies, green drakes, *Tricos*, mahogany duns, *Hecuba*, and *Baetis*, the Bitterroot should provide desirable results through this summer and fall.

"The fishing here is just darn good," says Chris Clancy, FWP biologist at Hamilton. "And it's a nice river to fish—big enough to float but small enough to wade." Clancy says that in 2004, water levels dropped significantly, "but then the skies opened up and it rained and we had water everywhere."

The only sour note on the Bitterroot system is the presence of whirling disease in the east fork. "We have seen declines in rainbow trout numbers in the upper Bitterroot," cautions Clancy. "Though we can't say for sure it's related to whirling disease, I am suspicious."

For now, anglers can continue to expect good action on the river's west fork and its entire mainstem. Clancy adds that the cutthroat trout population has been increasing steadily for the past ten years and that cutts are most prevalent in the upper river.

## Beaverhead River

The good news from Beaverhead country is that the river's rainbow trout are prospering and anglers are catching and releasing some true hogs—'bows ranging between 17 and 22 inches—in the upper reach between Clark Canyon Dam and Pipe Organ Bridge.

The bad news is that extended drought has reduced the river's 20-inch-and-larger brown trout by 83 percent and 18-inch-and-larger brown trout by 55 percent from the peaks of the late 1990s. Fortunately, the system has decent numbers of smaller browns and, according to FWP biologist Dick Oswald, probably reached its low point in 2003 or '04 and now is on the rise.

"Anglers are still having a good time on the Beaverhead," Oswald says. "Many of them are beginners, and if they catch a couple of decent brown trout and maybe a big rainbow in a day, they are real happy."

## Lower Clark Fork

On the stretch of the Clark Fork from the mouth of Rock Creek to the confluence with the Flathead River, drought and whirling disease may be harming juvenile rainbow trout recruitment. But that hasn't seemed to influence catch rates or overall angler satisfaction.

FWP biologist Ladd Knotek expects quality fishing this summer and fall on the Clark Fork, which has roughly 300 catchable (8-inch-plus) trout per mile.

"We are seeing the onset of whirling disease and some long-term effects of drought, with lower redd counts for bull trout, and populations of rainbows and cutthroats dropping down to the lower end of their range," Knotek says. "But I don't think that affects catch rates significantly. When water is low, the fish congregate and anglers find them more easily. I expect 2005 to be a typical year on the Clark Fork."

That means excellent fishing early and late in the season, with September and October the top months. "There's no question that the second and third weeks of September are the best," says Drew Miller, head guide for Grizzly Hackle Fly Shop in Missoula. "You still see fish eating 'hoppers, and we also are getting hatches of mahogany duns, *Baetis*, *Tricos*, and October caddis."

## Yellowstone River

The Yellowstone has maintained solid flows throughout the drought, resulting in robust populations of rainbow, cutthroat, and brown trout.

That's the word from Jim Brungardt at Yellowstone Angler in Livingston, who predicts outstanding fishing this season.

"Our 'hopper fishing was excellent last year, some of the best I've seen in 20 years," Brungardt says. "It started early and ended late in the season. Overall, fishing was good, except from mid-September to mid-October, when for some reason everyone was having problems. Then the fishing picked up again and lasted well into November."

Attractor patterns should be the ticket on the 'Stone this summer. Try a foam hopper, Parachute Madam X, or Turck's Tarantula. For huge browns, try bouncing a weighted Muddler Minnow or Double Bunny along the bottom rocks through the deepest pools.

"There are some good fish in the river," Brungardt adds. "Last year the fish were in great shape, and they've been that way for several years. I would expect the same quality trout this season."

## Missouri River

There's a rumor that the Missouri's rainbow trout population is about to tank due to the effects of whirling disease and drought.

But that's been the rumor for six years. And for six years anglers have continued to catch lots of rainbows in the river's premier stretch between Holter Dam and Cascade. They should continue to enjoy good fishing again this year, though maybe not like in the heyday a few years ago.

"Our fall estimates showed the number of rainbows near average or just slightly below average in our two sampling sections," says FWP biologist Travis Horton. "We have seen a notable decline in rainbows 17 inches and longer. Those fish went from an average of 2,300 per mile in 2002—which was three times the long-term average—to 1,500 per mile in 2003, to 900 per mile in 2004, which is right about the long-term average for 17-inch-plus rainbows in the Missouri."

Even with that decline, Horton notes, the Missouri is an amazing fishery containing 2,000 to 3,000 trout per mile. "And lots of those older fish that have died off were in bad shape—skinny, hook-scarred, and suffering from a parasite on their gills," he says. "The fish now in the river are healthier in general and more vigorous."

## Blackfoot River

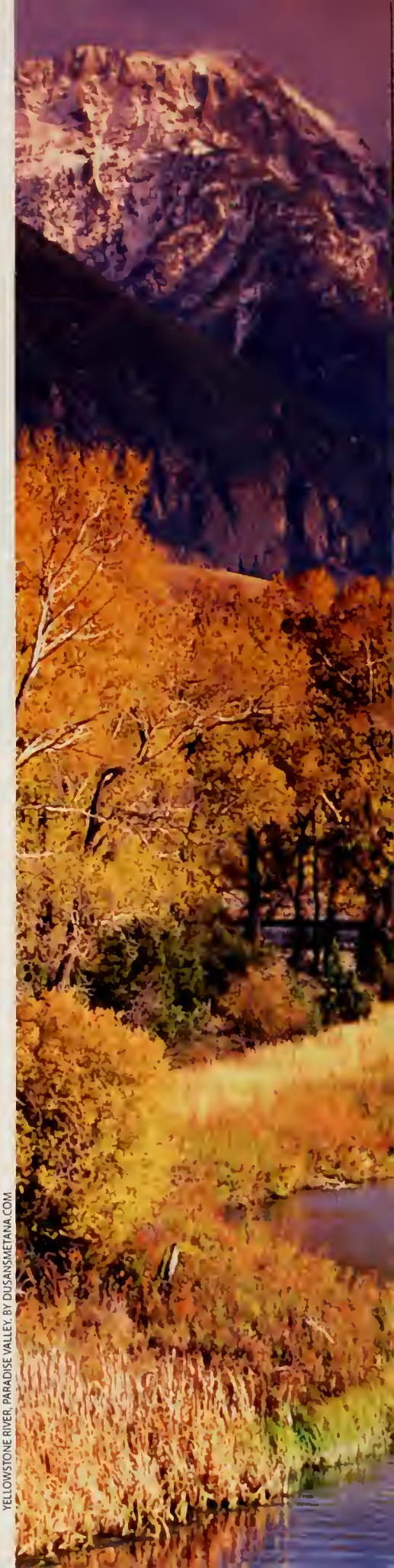
The Blackfoot River and its rainbow trout population are suffering severely due to ongoing drought conditions. However, summer rains saved the river last year, and anglers caught decent numbers of brown trout and a few cutthroats and rainbows during several great big-bug hatches.

"Three hatches stood out last year," says George Kesel, who runs Kesel's Four Rivers Fly Shop in Missoula. "The salmonflies came off really good in June and July, the green drakes were strong in early July, and the golden stones were present through all of July. In addition, we had great streamer fishing, with black Woolly Buggers and tan sculpins working best. I'm hoping we'll see a similar situation this year."

Last year's rains also influenced the river in an unexpected way. The wet weather kept the lower river's fleet of innertubers off the water, allowing anglers a chance to fish below Johnsrud Park without competition from recreational floaters.

"I warn fishermen to stay off the lower river when the weather is nice," Kesel says. "But last year innertubers didn't come out in the rain, and we caught some good browns through that stretch. Hopefully, it will rain again this season."

EDITOR'S NOTE: *As this issue went to press, in late April, snowpack in many Montana mountain ranges was extremely low, which could result in low flows and even closures to some river stretches. Anglers should call ahead to fly shops to check current conditions.*



YELLOWSTONE RIVER, PARADISE VALLEY, BY DUSANSMETANA.COM

# Little Dams, BIG BARRIERS

Diversion dams on the Yellowstone River system cause the loss of countless fish each year, including one species' near-extinction. One irrigator has found a way to keep fields watered while helping fish survive. Will others follow? **BY TOM DICKSON**

Roger Muggli had seen enough. In June of 1988, as he had every spring for years, the manager of the Tongue and Yellowstone (T-Y) Irrigation District in southwestern Montana watched as hundreds of downstream-swimming fish were sucked into the irrigation canals where the 12-Mile Diversion Dam diverts the Tongue River. The 100-plus miles of canals in the T-Y irrigation system send water to crops such as alfalfa, corn, and barley, as well as to vegetable gardens and orchard trees, on 9,400 acres owned by roughly 300 families. But the channels also capture sauger, catfish, perch, sunfish, smallmouth bass, and a dozen other fish species.

"It just killed me to see those fish get trapped in the canals," Muggli says.

Each spring, several dozen species spawn in the upper Tongue and other tributaries of the Yellowstone River. After the eggs hatch, the young fish float downstream with the current. Before the region was settled, they eventually would end up in the Yellowstone.

But that was before construction of diversion dams—3- to 8-foot-tall concrete or rock structures on the Yellowstone and major tributaries. The dams divert water from the main current into canals to irrigate crops in thirsty fields nearby. Unfortunately, fish move into the canals along with river water. They are then inadvertently pumped out onto crop fields as part of flood irrigation. Or they stay in the canals, easy prey for herons and raccoons when the canals are drained in late summer.

"Either way, the vast majority of those fish don't make their way back to the Yellowstone," says Brad Schmitz, Montana Fish, Wildlife & Parks regional fisheries manager in Miles City.

TOM DICKSON

**FISH FRIENDLY** Roger Muggli, shown here on the Tongue River's 12-Mile Diversion Dam, says he felt a personal obligation to find some way for fish to move past the irrigation structure.

Schmitz and other biologists estimate that hundreds of thousands of fish are lost each year on the Yellowstone system to what they call "entrainment."

The 12-Mile Diversion Dam, 12 miles up the Tongue River from Miles City, was built in 1885. Muggli's father managed the water there for nearly 30 years, and his grandfather before that. As a boy, Muggli had seen fish entrained in the canals. In 1988, when he became manager, he decided to do something about it.

"I vowed then that if I lived long enough, I'd get the Tongue River fixed," says Muggli, who also runs a feed processing plant near Miles City with his family.

Over the next 11 years, Muggli "fought like hell to get support for this project," he says. To document fish entrainment, he convinced FWP to set survey nets. Biologists found that at least 37,000 fish go down the irrigation canal each year. Then Muggli galvanized financial support from public agencies and national conservation groups to replace the aging inlet into the canal. The renovation included adding a downstream bypass to screen fish from the canal and allow them to move around the dam (page 15). Completed in 1999, the project cost $900,000; just $60,000 was required from the irrigation district.

"That was a big selling point for our guys," says Muggli.

**HOOVER DAMS TO SOME FISH** Though essential for crop irrigation, Waco-Custer (above) and five other diversion dams on the Yellowstone River block the upstream migration of burbot, suckers, and other fish species. Farther downstream, Intake Diversion Dam stops federally endangered pallid sturgeon (right) from reaching upstream spawning waters.

USFWS

Now fish are moving down the Tongue in numbers not seen for more than a century. On the Yellowstone itself, however, diversion dams continue to damage fish populations, threatening both angling recreation and the very existence of some species.

Biologists, anglers, and others concerned about river fisheries now hope the 12-Mile Dam improvements will inspire owners of diversion dams on the Yellowstone River to consider similar modifications to help fish. For that to happen, however, public interest in the Yellowstone's warmwater fish—and public funding for conserving those species—may have to increase.

## "LAST BEST RIVER"

Running 670 miles from Yellowstone National Park to where it joins the Missouri River near the Montana–North Dakota border, the Yellowstone is one of the wildest rivers in the lower 48 states. That's due in large part to Montana FWP and state leaders. In the late 1970s, they thwarted efforts by the U.S. Corps of Engineers to build a 660-foot-tall dam a few miles upstream from Livingston that would have drowned the entire Paradise Valley.

Today, abundant antelope, mule and white-tailed deer, and an occasional elk continue to graze in the Yellowstone's lushly wooded bottomlands. Thirty-three native fish species swim in the river, from colorful Yellowsrone cutthroat trout in the upper reaches to prehistoric paddlefish in the lower, warmer waters.

Much of what *National Geographic* magazine called the nation's "last best river" still contains braided channels, sandbars, and islands that provide important fish habitat. Along much of its length, the Yellowstone—named by Plains Indians for the sandstone bluffs that overlook the river near present-day Billings—looks remarkably similar to when Captain William Clark canoed downstream in 1806.

Though free of large impoundments such as those on the Missouri, the Yellowstone is not the longest "undammed river" in the United States, as it is often described. Diversion dams block the river at six sites between Billings and Sidney. Like 12-Mile Dam on the Tongue, the Yellowstone's Huntley, Waco-Custer, Rancher's Ditch, Yellowstone, Cartersville, and Intake diversion dams were built decades ago to provide water for crop irrigation.

From an agricultural perspective, "these dams have been a huge economic success," says Jerry Nypen, manager of the Lower Yellowstone Irrigation Project, a nonprofit organization that owns the water rights at Intake. "They have contributed immensely to the ag economy along the Yellowstone, without creating huge reservoirs like you see on many other major rivers."

From a fisheries health perspective, however, the Yellowsrone River's diversion dams cause major problems for sturgeon and other fish populations.

> "Let's say 50,000 of those sauger would have otherwise grown up to be 12 inches and larger. That adds up to 10,000 five-fish angler limits lost just at Intake every year. That's a huge amount of recreation disappearing down a ditch."—Brad Schmitz, FWP Regional Fisheries Manager, Miles City

## ONE-WAY STREET

Each year tens of thousands of sauger take an ill-fated detour into canals siphoning water from the Yellowstone. These smaller cousins to walleyes are then either pumped out into fields along with irrigation water or left stranded in the ditches.

After a 2003 Montana State University study found that none of 27 radio-tagged sauger that entered Intake Canal returned to the Yellowstone River, biologists concluded the canal is a one-way street. When he analyzed results of a Bureau of Reclamation (BOR) study on entrainment at Intake conducted in the late 1990s, Schmitz estimated that at least 70,000 sauger over 8 inches long disappear into that one canal each year.

"Let's say 50,000 of those sauger would have otherwise grown up to be 12 inches and larger," he says. "That adds up to 10,000 five-fish angler limits lost just at Intake every year. That's a huge amount of recreation disappearing down a ditch."

The ditches attract other species, too. Two years ago, Schmitz caught a 35-pound paddlefish in Intake Canal. And Steve Hiebert, who headed the BOR study, says that the survey nets he and his crew set inside the Intake headworks captured catfish up to 3 pounds, walleyes up to 4 pounds, and 30 other species, including sturgeon chubs, goldeye, and blue suckers. He estimates at least 500,000 fish are sucked into Intake Canal each year.

"And that's just based on the fish that we caught in our half-inch mesh nets," Hiebert says. "There's no telling how many smaller, juvenile fish go into the canal."

Add entrainment from the five other diversion dams—as well as from hundreds of pumps drawing water directly from the river—and losses on the Yellowstone likely total millions of fish each year.

*Tom Dickson is editor of* Montana Outdoors.

**OFF TO NOWHERE** Many fish moving down the Yellowstone River are drawn along with water flow into irrigation canals (white arrow) fed by the Cartersville and other diversion dams.

## END OF THE ROAD

While the diversions dams are drawing off downstream-swimming fish, they're also blocking those trying to move up the Yellowstone to spawn. Walleye, sauger, and several other species can swim over the dams during high water. But bottom-hugging species find the structures insurmountable.

To a pallid sturgeon, for example, a diversion dam might as well be Hoover Dam. "They don't have the physical form to swim up rapids, much less over an actual barrier," says Schmitz. The pallid's wedge-shaped head has evolved to keep the fish close to the river bottom, where it finds fish, aquatic insects, and other food.

Currently only 4,000 or so pallid sturgeon exist in the United States, making the species one of the nation's rarest and causing it, since 1990, to be listed as federally endangered. In the Yellowstone, which has some of the nation's best remaining pallid sturgeon habitat, numbers are down to fewer than 200.

"There are now so few," explains Schmitz, "that it's hard for a mature male and mature female to even find each other, much less spawn successfully." As a result, there has been no documented "recruitment" (new fish being born into the fishery) in the river for more than 30 years.

Diversion dams aren't the only reason the Yellowstone's pallid sturgeon may become extinct within the next few decades. Another big factor is Yellowtail Dam, built on the Bighorn River in 1966 to create energy and control flooding in the valley below. Behind the dam is 500-foot-deep Bighorn Reservoir, which releases cool, clear water from its depths. The dam has created one of the nation's top trout fisheries downstream in the Bighorn River, a Yellowstone tributary. However, it has also deprived the Yellowstone's warmwater species of yearly floods, which for millenia sent sand, woody debris, and sediment downstream, producing sturgeon food and creating spawning and rearing sites.

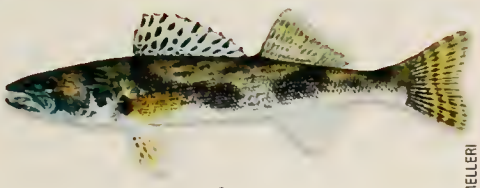
## LIKE THREE RIVERS COMBINED

The greatest barrier on the Yellowstone is also the biggest straw sucking water from the river. Intake Diversion Dam, located 18 miles downstream from Glendive, draws up to 1,400 cubic feet of water per second. That's more than the average flow of the Big Hole, Beaverhead, and Gallatin rivers combined.

Intake Dam was built in 1911 to divert water from the Yellowstone River to 50,000 acres in eastern Montana and western North Dakota. Made of rocks in timber cribs, the 5-foot-tall structure stretches 700 feet across the river. Depending on the time of year, it pushes up to half the Yellowstone River into Intake Canal and a 225-mile network of lateral canals that move and distribute water to roughly 500 farms.

According to George Jordan, Yellowstone River coordinator for the U.S. Fish and Wildlife Service, Intake Dam is "a known barrier for the upstream migration of pallid sturgeon, paddlefish, and other species in years when water is low."

Intake is owned by the Bureau of Reclamation. Because the Endangered Species Act requires that federal projects



Sauger

JOSEPH TOMELLERI

not harm listed species, Jordan says "the USFWS is helping the BOR evaluate various options that would allow for upstream fish passage and reduce entrainment."

Nypen, the irrigation project manager for the lower Yellowstone, says his organization recognizes that fish are entrained in the canal. "We've known that for years, and we think a fish screen of some sort would be helpful," he says. The group is skeptical, however, about building an upstream passageway, at least for now. "There probably should be more research on the need for that," Nypen says.

Jordan says he has no doubt the dam will be modified, but it may take several years. The delay, he says, is due in part to the lack of a warmwater fish group to advocate on behalf of sturgeon and other Yellowstone River species. "It's too bad there isn't something like a Sturgeon Unlimited that could turn up the heat in Washington, D.C.," he says, only halfway kidding.

### WORKING WITH IRRIGATORS

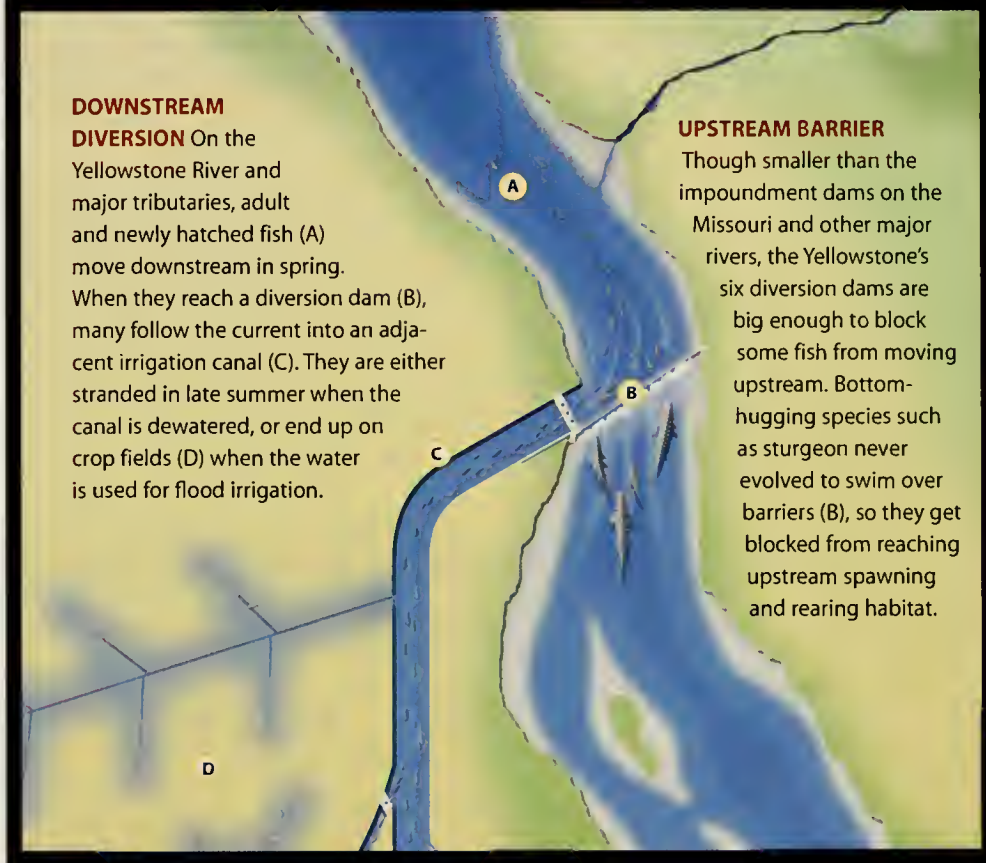
Though biologists are adamant about wanting to keep fish in the rivers and off crop fields, they don't want to impede irrigation.

"No one is trying to prevent irrigators with water rights on these ditches from getting their water," says Matt Jaeger, FWP's lower Yellowstone River fisheries biologist. "We just want to minimize the number of fish entrained and killed in ditches and limit the restriction of passage around diversions as much as possible."

That's why river advocates are applauding what Muggli and others are accomplishing on the Tongue. "The T-Y project has been the perfect cooperative venture among agencies and the irrigation district," says Jordan. "It's a model for what could happen on the Yellowstone and other tributaries."

In addition to getting the downstream fish bypass structure built in 1999, Muggli, state and federal agencies, and The

## How diversion dams affect fish movement

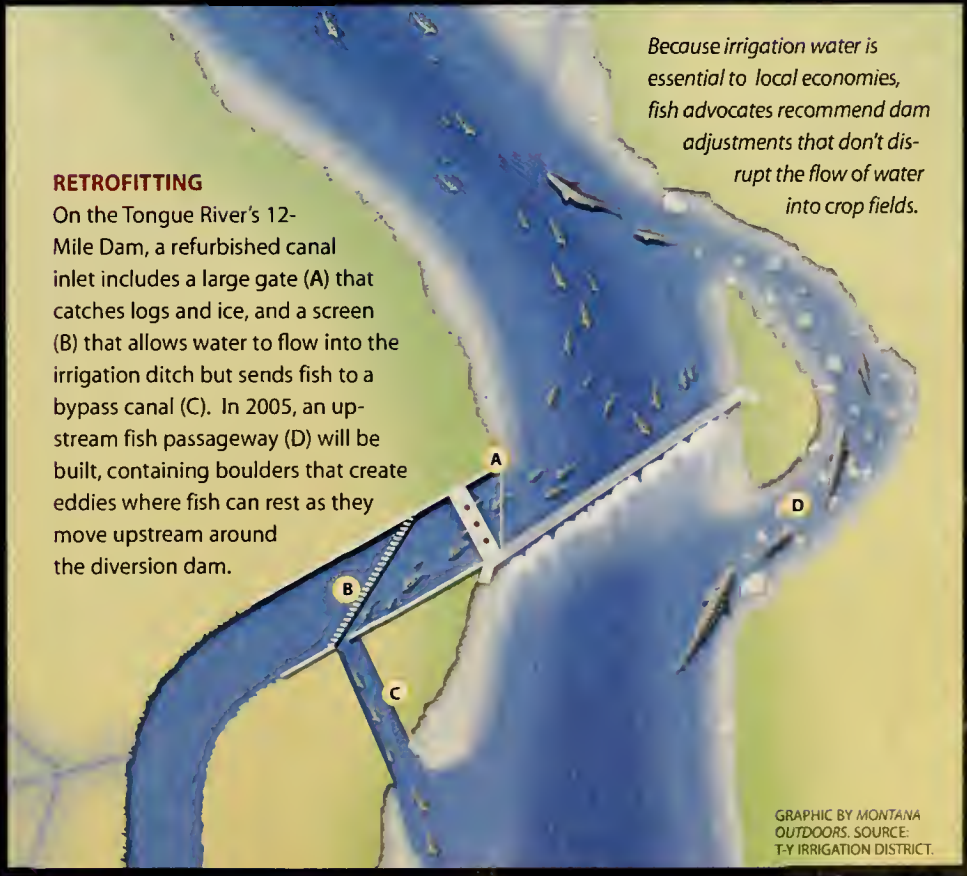



**DOWNSTREAM DIVERSION** On the Yellowstone River and major tributaries, adult and newly hatched fish (A) move downstream in spring. When they reach a diversion dam (B), many follow the current into an adjacent irrigation canal (C). They are either stranded in late summer when the canal is dewatered, or end up on crop fields (D) when the water is used for flood irrigation.

**UPSTREAM BARRIER** Though smaller than the impoundment dams on the Missouri and other major rivers, the Yellowstone's six diversion dams are big enough to block some fish from moving upstream. Bottom-hugging species such as sturgeon never evolved to swim over barriers (B), so they get blocked from reaching upstream spawning and rearing habitat.

## Solutions that don't hamper irrigation

*Because irrigation water is essential to local economies, fish advocates recommend dam adjustments that don't disrupt the flow of water into crop fields.*




**RETROFITTING** On the Tongue River's 12-Mile Dam, a refurbished canal inlet includes a large gate (A) that catches logs and ice, and a screen (B) that allows water to flow into the irrigation ditch but sends fish to a bypass canal (C). In 2005, an upstream fish passageway (D) will be built, containing boulders that create eddies where fish can rest as they move upstream around the diversion dam.

GRAPHIC BY *MONTANA OUTDOORS*. SOURCE: T-Y IRRIGATION DISTRICT.

Nature Conservancy funded an upstream fish passageway around the west side of the dam. As part of that effort, Muggli persuaded his irrigation district to donate 3 acres of land and digging equipment. The $300,000 project, which will begin later this year, includes a 660-foot canal filled with large boulders that block current flow and create eddies where fish can rest as they move upstream around the dam. The fish bypass will allow roughly 30 species to reach an additional 50 miles of spawning water in the lower Tongue (before running into another diversion dam) for the first time since the late 19th century.

"We joke with Roger that we want him to go on tour and talk to other irrigators to lessen their distrust of state and federal agencies," says Jordan. "We're hoping they will look at the T-Y structures and see for themselves that you can have fish passage and water irrigation, that the one doesn't need to cancel the other."

Muggli says he has his hands full with just the one diversion dam on the Tongue. But he's hopeful other irrigation districts along the Yellowstone will be intrigued by what he has accomplished. "Public agencies aren't the only ones that can get things done," he says. "It also takes effort by individuals to move things along.

"Not many people get the chance to improve a river, and I'm not going to rest until the fish that have been blocked all these years are finally able to make their way upstream as well as downstream, so that the circle is complete," he adds. "Only then can I feel that I did my part to repair something in eastern Montana that has been broken for far too long."

Meanwhile, Jordan and other fish advocates say they will continue working with irrigators to find ways to adjust the Yellowstone's diversion dams to benefit fish.

"We know that the dams are causing problems, and we're learning how the structures can be modified to allow for fish passage without compromising irrigation needs," says Jordan. "What we really need now are more Roger Mugglis."

## The Armored Canal

Diversion dams and the Bighorn River's changing water composition aren't the only things disrupting the Yellowstone River ecosystem. For decades homeowners, farmers, and communities on the upper Yellowstone between Livingston and Billings have built shoreline dikes ("levees") to prevent flooding and lined banks with boulders ("riprap") to lessen bank erosion. These shoreline reinforcements, say biologists, rob the Yellowstone of its natural hydrological functions, thus harming fish, wildlife, and native vegetation such as cottonwoods.

Record floods in 1996 and 1997 tore away portions of Yellowstone riverbank and inundated thousands of acres. Afterwards, communities and landowners began riprapping the river like never before. By 2000, roughly 40 percent of the shoreline between Laurel and Billings was riprapped, and tons of boulders were installed along the river's banks near Livingston and Big Timber.

Anglers and other conservationists became alarmed at the rapid transformation of the river. "Parts of the Yellowstone have now become less a meandering natural river and more of an armored ditch," says Joe Gutkoski, president of Montana River Action, a coalition of conservation groups formed in 2000 to stop dike construction and riprapping. Though flooding and bank erosion in the immediate area have declined, the narrowing of the river has increased water speed and energy, likely leading to greater flooding and erosion downstream.

"Riprap in one or two places is no big deal," says Bruce Rich, FWP regional fisheries manager in Bozeman. "But if everyone keeps armoring the banks, then the water and its energy are diverted downstream, where it becomes more powerful and eventually spills out, creating even worse flooding."

In addition, the inability of the Yellowstone to occasionally overflow its banks has robbed floodplains of the valuable silt needed to rejuvenate cottonwoods and other plants that depend on periodic high water. Also, braided channels, sandbars, and islands that provide fish and wildlife habitat have been reduced. A 1998 FWP study found that trout populations in the Livingston stretch, heavily fortified by riprap and levees, dropped by 50 percent after the record floods. "The area just got hosed down and blew fish out of the area," says Joel Tohlz, FWP fisheries biologist in Bozeman. "There was no place for fish to escape."

GEORGE WUERTHNER

**BETWEEN A ROCK AND A HARD PLACE** Floodwaters must eventually spill out somewhere. By building dikes and armoring banks with riprap, communities and landowners squeeze the river and move flood energy downstream, where it creates even worse flooding for people there.

Rich points out that no single riprapping or levee project is to blame. "It's the cumulative effects of tens and then hundreds of projects that add up," he explains.

As more people build on riverfront property, the demand for bank "improvements" continues to grow. "The irony," notes Rich, "is that the wildness of the Yellowstone is what draws people to the river. And what they are doing to the river is actually lessening the wildness that attracted them in the first place."

*—Tom Dickson*

# Warbler Wonderland

BY JOHN C. CARLSON

"Chestnut-sided," Ted Nordhagen whispered as he lowered his binoculars. It was late May, and we were glassing the latest crop of warblers to descend on the city park in Westby, a small Montana town just a few miles south of Saskatchewan on the North Dakota border.

Small even by Montana standards, Westby has over the past several years become a favored destination for birders looking for warblers. Small perching birds, warblers capture the attention of bird watchers primarily due to their beautiful coloration. Of the 53 warbler species in North America, 29 have been observed in the Westby city park.

The 1-acre park is nothing more than a few picnic tables, a hedge of Caragena shrubs, and a scattering of green ash and cottonwoods. It looks like a place where you'd expect to see nothing more interesting than a magpie or a robin. But each spring and fall, the trees and shrubs in the tiny park fill with hundreds of brightly colored warblers moving across the northern Great Plains. Some warbler watchers drive 400 miles or more to see Westby's warbler spectacle.

> We wandered the park, heads craned back, prompting a condition known as "warbler neck."

The warblers and the birders converge here in late May and early June and again in late August and early September. The birds are searching for insects to fuel their journeys, while the birders are looking for species rarely found anywhere else in Montana. Many warbler species, such as the Cape May and magnolia, are known in Montana as "eastern" warblers because they are rarely found breeding west of Minnesota in the continental United States. Yet these species are regularly found in Westby during their spring and fall migration.

That's because they breed far northwest of Montana in the boreal forests of Alaska and northwestern Canada. In the spring, when the birds leave their winter homes in Central and South America, many fly across the Gulf of Mexico to the Gulf Coast and continue migrating north until they reach the Dakotas. There they veer northwest toward the Yukon. Westby is located in the right place to regularly catch the westernmost edge of this stream of birds (which in fall also comes through the tiny town on its way south).

But it's not just the rarity of warblers that attracts bird watchers to Westby. Just as important is seeing the colors of these active birds—the lemon yellows and blue-blacks of the magnolia warbler, the flaming orange of the Blackburnian warbler, or the deep chestnut of the bay-breasted warbler. It's a welcome sight after a long, drab winter.

Nordhagen, who grew up birding this park and still lives nearby, alerted the Montana birding community to Westby's warbler diversity. If you visit Westby during the migration, you will probably find him and other birders wandering through the park, heads tilted upward, binoculars ready.

Before you make the trip, check the weather forecast. In spring, the best warbler-watching weather is a cold front with winds from the north, which forces birds from the sky into the sheltering trees of the park. Southerly winds and fair weather allow birds to continue flying north. (The migration in the fall is more drawn out, and observations in the park that time of year are less weather dependent.)

Nordhagen has told me more than once upon my arrival that "you should have been here yesterday." That's why anyone making the long drive should plan on staying in the area a few days to ensure they catch the weather favorable for seeing migrating warblers.

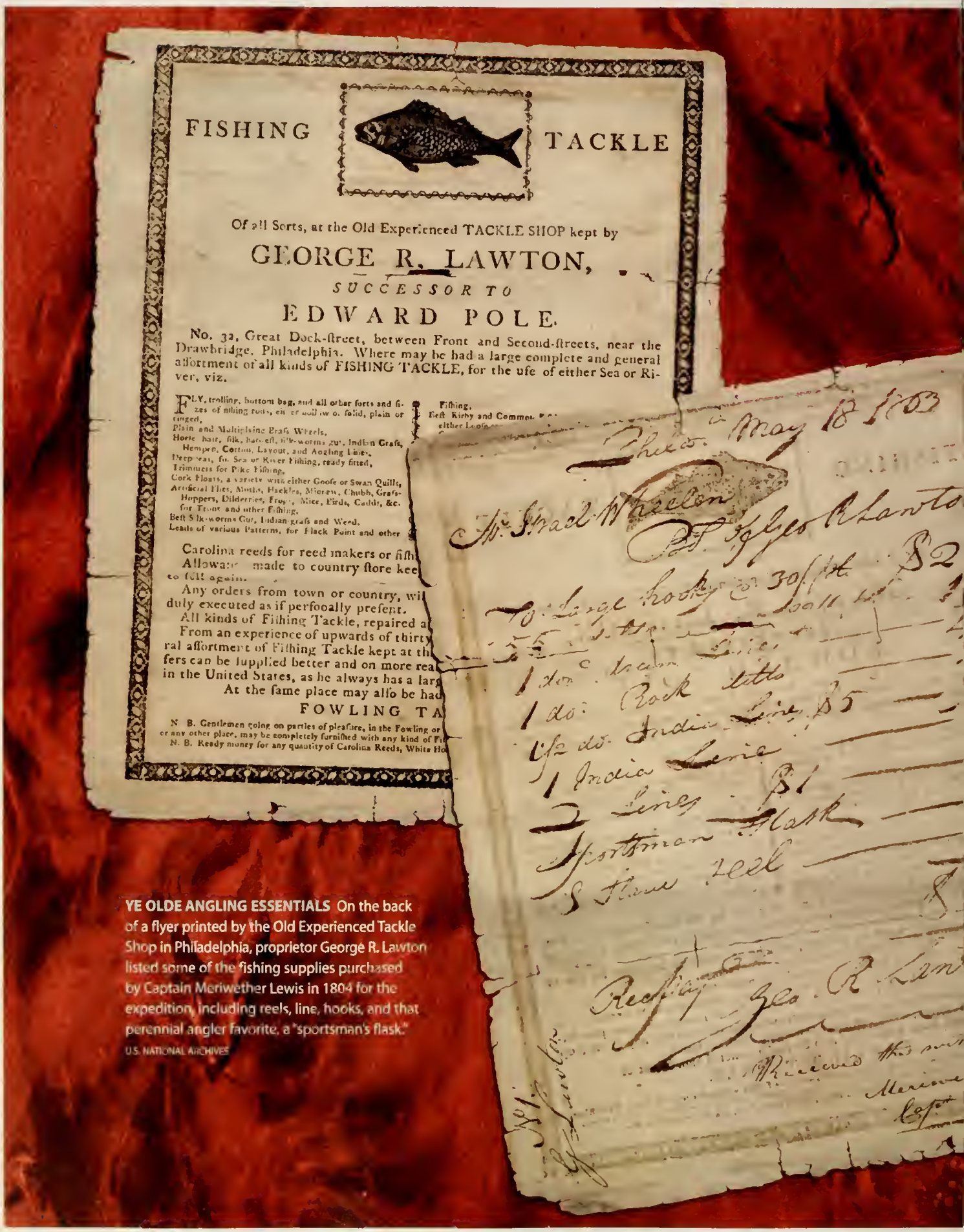
Nordhagen and I continued to slowly wander through the park that May morning, heads craned back looking for the latest arrivals in the treetops, prompting a condition by mid-morning known as "warbler neck." We saw several warbler species: yellow, yellow-rumped, black-and-white, blackpoll, and black-throated green. Unfortunately, I wasn't able to add the black-throated blue warbler to my state list. It's a species I have wanted to see since I began birding 30 years ago.

Still, I did see some beautiful spring color moving through the trees that day.

CHESTNUT-SIDED WARBLER BY BRIAN E. SMALL

Streams of migrating warblers nick Montana's northeastern corner as they fly north through the Dakotas then veer toward the Yukon.

*John C. Carlson is a wildlife biologist for the federal Bureau of Land Management in Glasgow.*


FISHING
TACKLE
Of all Sorts, at the Old Experienced TACKLE SHOP kept by
GEORGE R. LAWTON,
SUCCESSOR TO
EDWARD POLE.
No. 32, Great Dock-ſtreet, between Front and Second-ſtreets, near the Drawbridge, Philadelphia. Where may be had a large complete and general aſſortment of all kinds of FISHING TACKLE, for the uſe of either Sea or River, viz.
FLY, trolling, bottom bag, and all other ſorts and ſizes of fiſhing rods, either hollow or ſolid, plain or ringed,
Plain and Multiplying Graſs Wheels,
Horſe hair, ſilk, harneſs, ſilk-worms gut, Indian Graſs, Hempen, Cotton, Layout, and Angling Lines,
Deep ſeas, for Sea or River Fiſhing, ready fitted,
Trimmers for Pike Fiſhing,
Cork Floats, a variety with either Gooſe or Swan Quills,
Artificial Flies, Minks, Hackles, Minews, Chubb, Graſs-Heppers, Dilderries, Frogs, Mice, Birds, Caddis, &c. for Trout and other Fiſhing,
Beſt Silk-worms Gut, Indian-graſs and Weed.
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Carolina reeds for reed makers or fiſh
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Any orders from town or country, wil
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May 18 1803
Mr. Israel Whelen
Mr. Geo. R. Lawto
70 Large hooks @ 30/ct
1 do Trout
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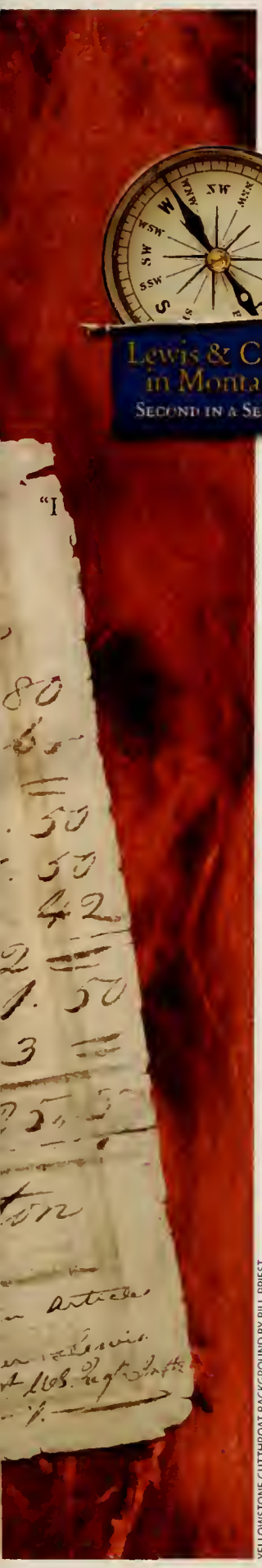
1 do India Line
1 India Line
2 Lines
Sportsman Flask
Reed
Geo. R. Lawton
Received this
Meriwe
Capt.

**YE OLDE ANGLING ESSENTIALS** On the back of a flyer printed by the Old Experienced Tackle Shop in Philadelphia, proprietor George R. Lawton listed some of the fishing supplies purchased by Captain Meriwether Lewis in 1804 for the expedition, including reels, line, hooks, and that perennial angler favorite, a "sportsman's flask."
U.S. NATIONAL ARCHIVES




YELLOWSTONE CUTTHROAT BACKGROUND BY BILL PRIEST

# A Different Angle on the Expedition

## DID FISH AND FISHING ALTER THE FATE OF LEWIS AND CLARK?

By Rick Genoch

"I amused myself in fishing," wrote Captain Meriwether Lewis the evening of June 15, 1805. The Corps of Discovery was camped below the Great Falls of the Missouri River, and that afternoon Lewis and other men of the expedition had enjoyed catching several cutthroat trout by baiting their hooks with "melt" (deer spleen).

The Lewis and Clark Expedition was an angler's dream trip. On some days, members caught bass, catfish, trout, or other species as fast as they could bait a hook. But fish meant more to the expedition than occasional amusement. Fish were important in the collection of scientific information. Lewis and Captain William Clark recorded 11 species of fish unknown to Americans at the time, and they mentioned more than 30 different species throughout the journey. Fish also staved off extreme hunger, providing the expedition with protein at times when deer and other game were scarce. And it was the sight of salmon on the Lemhi River in today's Idaho that told Lewis the Pacific Ocean was finally within reach.

USFWS

Channel catfish, a Corps favorite.

### "Numbers of Cat fish cought"

During the first summer of the expedition, the Corps of Discovery members became accustomed to pulling large quantities of fish from the Missouri River. The men had regularly caught fish since leaving St. Louis in the spring of 1804. Their best success came while fishing a Missouri River tributary in today's Nebraska, catching more than 800 fish in a single day.

The group's master angler was Silas Goodrich, whom Lewis described as "our fine fisherman." During the day, the young private often dropped a line from the end of the keelboat as it moved upstream. In the evenings, he would lead the men in casting lines from the sandy banks, at times hauling in fish by the dozens before dark. They caught smallmouth bass, freshwater drum, northern pike, and, most beloved by the men, catfish.

The tasty catfish fillets were excellent food, and the fish were easy to obtain. In what is now South Dakota, Clark wrote, "Numbers of Cat fish cought, those fish is so plenty that we catch them at any time and place in the river."

Once the expedition entered Montana, in April 1805, the men began encountering new fish species. It was in this stretch of the Missouri that Lewis first described the sauger and goldeye. But the fish seemed less abundant than before. On May 22, Lewis wrote, "We have caught but few fish since we left the Mandans, they do not bite freely...." Fortunately, that created no food hardships, for the expedition had entered a region of North America with nearly limitless quantities of game. The captains wrote

about large herds of elk, deer, antelope, and bison that numbered in the thousands. However, even with such abundant and accessible game, Goodrich and the others continued to wet their lines, a testament to how much the men loved to eat fish.

## "...very fine trout."

Once the expedition reached the Great Falls, the Missouri River's water temperature grew too cool for catfish but became suitable for trout. Tributaries from as far away as today's Yellowstone National Park, 250 miles to the south, cooled the river with mountain runoff throughout the summer.

"Goodrich had caught half a douzen very fine trout," Lewis wrote on June 13, 1805, at the base of the Great Falls. Those trout, ranging from 16 to 23 inches, were westslope cutthroat, the first ever caught by an American.

For the next six weeks, as they continued upstream through the valleys of southwestern Montana, expedition members caught more cutthroat than any other species. But the trout weren't as plentiful as the catfish caught the previous summer. For several weeks Lewis wrote little about fishing, mentioning only that he occasionally saw fish, most of which were trout.

As the expedition moved past the Three Forks, Lewis worried his men might soon go hungry. "I know when we leave the buffaloe country that we shal sometimes be under the necessity of fasting occasionally," he wrote on July 3. Sacagawea, their Shoshone interpreter, had informed them they would soon be leaving the buffalo range. And deer, elk, and other game were growing less abundant as they moved south up the river they had named for President Jefferson.

To add to the frustration, expedition members could often see fish but not catch them—a curse afflicting anglers from Izaak Walton's time to today. Wrote Lewis, "We see a great abundance of fish in the stream some of which we take to be trout but they will not bite at any bate we can offer them." At this point in the journey, the men could not count on fish for dinner.

Lewis grew increasingly desperate. Food was scarce, and he had yet to meet up with the Shoshone Indians he'd hoped would trade horses essential for carrying gear over the Rockies. Near present-day Dillon, Lewis took three men up a tributary of the Jefferson River (now called the Beaverhead) to locate Sacagawea's people.

**FINALLY, SALMON** Captain Lewis's illustration of a salmon, from his journal dated March 16, 1806. He first encountered salmon (facing page) the previous August, after crossing the Continental Divide into today's Idaho. He wrote that the salmon on the Lemhi River were the first "I had seen and perfectly convinced me that we were on the waters of the Pacific Ocean." AMERICAN PHILOSOPHICAL SOCIETY

After leaving the river and heading west over the Continental Divide at Lemhi Pass into what is now Idaho, Lewis finally made contact with the Shoshone. There, in the Lemhi Valley, the captain found a new food source for his hungry expedition. Though they were leaving behind the game-rich grasslands, Corps members were about to enter the drainage of one of the world's great salmon fisheries.

## "this was the first salmon I had seen...."

Over the next two weeks, while negotiating with the Shoshone for horses, Lewis learned and wrote more about fish than anywhere else on the journey. Fish were far more important to Indians in this region than to those east of the divide. Biologists estimate that at the time 10 to 16 million salmon and steelhead migrated from the Pacific Ocean. Salmon and steelhead were to the Indians of the Northwest what bison were to the Plains tribes.

Lewis had his first taste of salmon on August 13, the same day he met the Shoshone chief Cameahwait. Lewis wrote that it was a momentous meal, for "this was the first salmon I had seen and perfectly convinced me that we were on the waters of the Pacific Ocean." Lewis and his men went back across the pass to find Clark and the main party. The expedition then returned to the Lemhi.

## "...they employ wairs, gigs, and fishing hooks."

Salmon reach the Lemhi by swimming up the Columbia River to the Snake River and its tributary the Salmon, then to the Lemhi and other mountain streams. Lewis described how the Shoshone captured these migratory salmon, writing that "in fishing they employ wairs, gigs, and fishing hooks."

The weirs were elaborately engineered fish traps. The Shoshone used trees to dam the Lemhi and spread it into four smaller channels, each with its own log dam. At the center of each dam, they placed a large, conical willow basket, which captured salmon swimming with the current. Each summer, the Shoshone hauled hundreds of salmon and steelhead from the weirs, then dried the fish to last through the winter.

The Indians also captured salmon with hooks, probably snagging the easily accessible fish. It's unclear whether these were bone hooks, or metal ones the Shoshone

*Nick Gevock is a freelance writer and a reporter for the* Bozeman Chronicle.

BRANDONCOLE.COM

had acquired through trade.

The Indians readily shared their abundant harvest with the Corps. But the men also caught salmon themselves. On the Lemhi River they built a "bush drag"—likely a seine of woven willow switches. Lewis wrote, "in about 2 hours they caught 528 very good fish, most of them large trout, among them I now for the first time saw ten or a douzen of a white species of trout."

The "white trout" were likely steelhead, a light silver–colored type of rainbow trout. Like salmon, steelhead live most of their adult lives in the Pacific Ocean but spawn in freshwater streams.

## "...doubts of Starveing...."

Overnight, the Corps's fishing success went from hot to cold. Lewis wrote that on the evening following the great salmon catch "we attempted to gig fish but were unsuccessfull only obtaining one small salmon." Such a meager harvest was disconcerting. As attempts to capture salmon continued to fail, Clark also wrote about his fear of starvation, noting that the men were "hourly Complaining of their retched Situation and doubts of Starveing in a Countrey where no game of any kind except a few fish can be found." He also sympathized with the Shoshone: "Those Pore people are here depending on what fish They Can Catch, without anything else to depend on."

The captains knew summer was ending, and that they had to beat the snow or perish in the mountains. Since they knew they were on a river leading to the Pacific, one option would have been to continue down the Salmon. But Cameahwait had cautioned Lewis against it. The Shoshone chief knew once the Salmon turned west a few miles downstream from today's town of North Fork, Idaho, it became a boiling caldron of whitewater. The river carved through steep cliffs and mountains covered in dense timber that would have been impossible for the expedition to traverse. (Today, that pristine, rugged region is the Frank Church River of No Return Wilderness.)

The captains wanted to see for themselves, so Clark took a small crew down the Salmon on August 23. So steep were the banks the men had to direct their horses into the river, which was so deep in places they had to swim. Clark turned back.

Lewis and Clark decided to leave the Salmon River and head north, back into today's Montana. A few days later, the captains headed over Lost Trail Pass then down along the Bitterroot River to try another crossing west that the chief had told them about.

Once in the Bitterroot Valley, Lewis described the river as a "handsome stream." But something was missing. Still on the Pacific side of the Continental Divide, the river should have contained anadromous (ocean-running) fish, but "from the circumstance of their being no sammon in it," wrote Lewis, "I believe that there must be a considerable fall in it below."

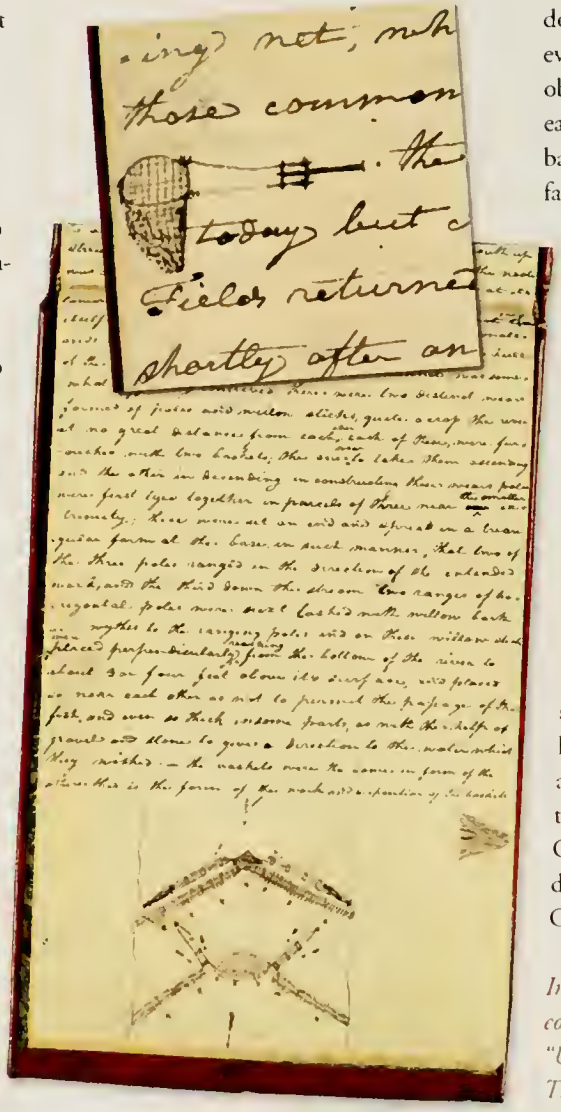
That may have been one reason the expedition didn't continue down the Bitterroot to the Clark Fork River. The last time the expedition had been forced around a large waterfall, at the Great Falls, it had required a month of grueling labor. With winter looming, Lewis surely didn't want to gamble on another lengthy portage.

Another reason for avoiding the Clark Fork was that Cameahwait had told the captains they could reach the Pacific by crossing the Bitterroots at Lolo Pass. The expedition almost perished on that crossing in a late-summer snowstorm, forcing members to eat one of the horses. However, the crew survived and eventually reached the Pacific.

Had the Corps of Discovery continued down the Bitterroot to the Clark Fork, it eventually would have faced several difficult obstacles, including Albani Falls in northeastern Washington. As Lewis suspected, the barrier prevented salmon from swimming farther upstream. Lewis's understanding of anadromous fish may have helped steer the expedition away from a lengthy and difficult route.

Did fish save the Lewis and Clark Expedition? Probably not. But trout and other fish supplemented the expedition's diet on days when game was scarce. And the gifts of salmon from the Shoshone, along with salmon the crew members caught themselves, came when the men were nearly starving.

What's more, the many hours Goodrich and the others spent fishing certainly added to their enjoyment and sense of discovery while making their historic journey. Today, anglers from across the United States continue to fish the same rivers traveled by Lewis and Clark, discovering for themselves the wonders of the American West seen by the Corps of Discovery two centuries ago.



**SALMONID SNARES** Lewis kept detailed notes of his men's and the Indians' fishing methods. Top: a fish net, May 18, 1806. Above: a Shoshone fish weir on the Lemhi River, August 21, 1805. AMERICAN PHILOSOPHICAL SOCIETY

*In June, the Federation of Fly Fishers' Discovery Center in Livingston will unveil "Undaunted Anglers: Fish of Lewis & Clark." This permanent exhibit will contain a room-sized mural of the expedition's river journey, replicas of early 19th-century fishing gear, a willow fish trap recently built by Shoshone high school students in Idaho, and more. For information, call (406) 222-9369.*

FLY ANGLER ON THE MISSOURI RIVER BY DUSANSMETANA.COM

# Lewis and Clark's Fisheries Today

Much has changed in the rivers traversed by the Corps of Discovery over the past two centuries. Yet much is the same.

What would likely surprise expedition members most are the seven major dams on the Missouri River, from St. Louis to the headwaters. The structures have turned much of the river into a chain of lakes. Dams have also altered the Columbia River system. Salmon must now negotiate four dams on the Columbia and four on the Snake to reach the Lemhi River and other mountain streams where they spawn.

Goodrich and others would also wonder what happened to the cutthroat trout. Cutthroat are the only trout native to Montana (except for rainbows in the far northwestern corner). But the easily caught cutts have been replaced with browns and rainbows in most rivers.

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The Corps never saw brown trout, which were first introduced to Montana in 1889.

What expedition members would have found familiar is the appearance of many Montana rivers. Thanks to limited riverside development, lengths of the Missouri and Yellowstone—and even a few small stretches of the Jefferson, Beaverhead, and Bitterroot—still look the same as they did 200 years ago.

How long that will last, however, is up to Montanans and others who value the sight of pristine river landscapes like those witnessed by Lewis and Clark and their Corps of Discovery. *—Tom Dickson*

VIEW OF THE MISSION MOUNTAINS FROM THE NATIONAL BISON RANGE BY MICHAEL J. WOLF

# Homing in on the Range

By Gary Beeler

**The 2,000-pound bison bull stood his ground in the middle of the narrow gravel road.**

The massive head, topped with heavy, black horns, hung low on the huge, shaggy hump of shoulder muscle. The horns seemed a bit too close to the grille of my little import, which I feared looked either like a scratching post or something to ram.

"Watch his tail," said my wife, Linda, as she read from the brochure we had picked up at the National Bison Range visitor center.

"Why his tail? His head's closer," I replied.

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**A LOT OF BULL** Male bison can weigh nearly a ton, and females about half that. Roughly 475 bison roam the hilly prairies at the National Bison Range, near Missoula.

"The brochure says that if the tail is hanging down, the bison is happy, but if it's sticking straight our, it's unhappy. And if it's pointing straight up, well, we might have to ride a bus home."

This one must have been content, because his tail was hanging low, twitching lightly. With an explosive snort that raised a small puff of dust from the road, the magnificent animal sauntered out of the way, and we continued our driving tour through one of the nation's oldest and most scenic wildlife refuges.

## From many to few

Millions of bison once roamed the western plains, but by the late 1800s only 1,000 or so remained. Of those, fewer than 100 lived in the wild. The rest of the West's great bison herds had been killed, mainly for commercial sale of their hides and meat.

In 1873 Walking Coyote, a Pend d' Oreille Indian, captured five wild bison, all orphaned calves, while hunting the plains east of the Continental Divide. He herded the calves back home to the Flathead Valley. In 1884, Walking Coyote sold his bison herd, which had grown to 13 head, to Flathead Valley ranchers Michael Pablo and Charles Allard.

Years later, Allard's heirs sold their herd to Charles Conrad. Pablo sold his to the Canadian government, which used the animals to reestablish a herd at Banff National Park in Alberta.

By the start of the 20th century, Americans feared that bison, a symbol of the Great Plains and the nation's West, would soon disappear entirely. After spending months searching for a bison to mount for the museum, Smithsonian Institution taxidermist William Hornaday became so alarmed at the lack of bison on his trip that he formed the American Bison Society. The organization convinced President Theodore Roosevelt and Congress to establish three bison reserves. The National Bison Range in Moiese was established in 1908 when the government bought 18,500 acres from the Confederated Salish and Kootenai Tribes. Using private donations, the American Bison Society stocked the range with 34 bison it purchased from the Conrad family.

Today, the range is home to 350 to 500 bison, as well as 50 other mammal species and 200 species of birds. The range is a destination not only for tourists but also students, researchers, and biologists studying everything from animal behavior to plant life.

## Life on the range

Bison are the largest living land mammals in North America. Females reach 1,000 pounds, and males can grow twice that large. The animals mate in late summer. When the calves are born, nine months later, their coat is reddish. After three months, the coat turns dark brown, like an adult's.

Cows may begin mating at age two. Though bulls are able to mate at age three, they wait a few more years until they can compete with the mature bulls for cows. Bison have a thick mass of fur on their head that protects them when fighting, a common activity among bulls during the July and August breeding season. The bulls lower their heads and charge from within 20 feet of each other, bumping heads (not horns), with little apparent damage.

Bison are most acrive in the early morning or late afternoon. During the heat of the day, they lie around chewing their cuds (regurgitated, undigested vegetation), roll-

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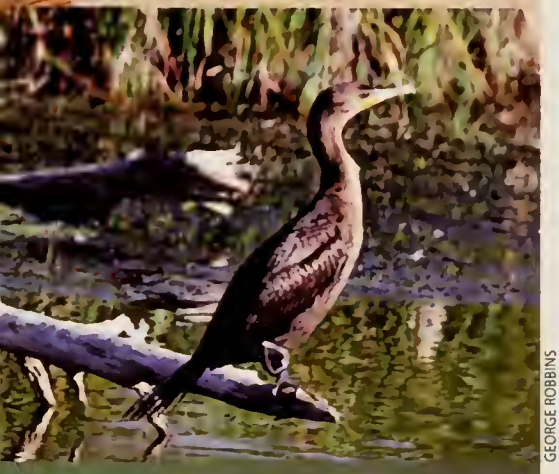
**NATIONAL BOA RANGE?** In addition to bison, the wildlife refuge is home to a variety of other wildlife. That diversity is largely due to the refuge's four distinct ecosystems: grassland, mountain forest, wetland, and streamside thicket. Among the menagerie visitors may see during a trip to the National Bison Range (from top to bottom): river otter, rubber boa, double-crested cormorant, and western meadowlark.



GEORGE ROBBINS

JEFFRICHPHOTO.COM

ing in wallows (shallow depressions), or taking dust "baths" to ward off insects. Bulls urinate in the wallows, then roll in the mud for increased insect protection.

Bison thrive on a diet of grasses and wildflowers. During the winter, they use their huge head as a shovel, swinging it back and forth to knock snow aside so they can reach the underlying vegetation.

With its heavy coat and massive size, a bison appears to be slow and sluggish, but it can run as fast as a horse (faster than any human) and jump a 6-foot-high fence.

## Outdoor classroom

Bison aren't the only animals thriving at the National Bison Range. The 30-square-mile area also holds roughly 150 elk and 100 pronghorn as well as mule deer, black and grizzly bears, mountain lions, bighorn sheep, coyotes, and bobcats.

The rolling hills contain wetlands, streams, and rare Palouse prairie, a rolling hill grassland more common in Washington, Oregon, and Idaho than in Montana. Conservation groups such as the Audubon Society conduct studies at the refuge. The U.S. Fish and Wildlife Service (USFWS), which manages the refuge, conducts ecology workshops and allows school groups to visit for science class outings.

Leslie Galarneau, who works at the nearby Country Side Café, has fond memories of visiting the bison range as a student.

"I grew up in Dixon," she says, "and on school trips we studied life in the ponds and went to the fall bison roundups. On the last day of school, we would go to the range for a picnic."

The USFWS uses the range as an outdoors laboratory. The longest-running research project, which began in the late 1940s, studies the effectiveness of using insects to control invasive noxious weeds. Much of the range is infested with dalmation toadflax, spotted knapweed, St. John's wort, and other harmful invasives. According to Bill West, deputy project leader for the range's weed control efforts, the best results have been on St. John's wort, also known as goat weed.

USFWS range managers use the Klamath weed beetle to limit the spread of St. John's wort.

*Freelance writer and photographer Gary Beeler lives in Boyd.*

"In 1995, we had 8,000 acres covered with St. John's wort," says West. "Klamath weed beetles were introduced to combat the weed. They cleared the range of that species and have not touched any other plant life." By 1997, says West, only 400 acres were infested with St. John's wort, a reduction of 95 percent. "The use of herbicides and helicopters would have cost us a half-million dollars," he adds. "The insect costs were just a fraction of that."

West adds that a new pilot project now underway makes use of local volunteers who locate biocontrol insects and weed areas and then log the locations into GPS recorders. Afterwards, technicians enter the data into a geographical information system, a multilayered computerized mapping program that resource managers use to control weeds more efficiently.

## Ecosystem tour

At the visitor center, guests can watch a movie about the refuge, get their questions answered, and pick up self-guided tour brochures. The shorter of the two tours, 5-mile-long Buffalo Prairie Drive, takes visitors past bison and great mountain views. But those who want to see the full extent of the refuge should take the longer route.

Four distinct ecosystems—grassland, mountain forest, wetland, and streamside thicket—comprise the National Bison Range, and all are visible from the 19-mile Red Sleep Mountain Drive. The grasslands are composed of bunchgrasses and wildflowers. Rough fescue grows on north-facing slopes, and bluebunch wheatgrass grows on the dryer southern slopes. The grasses thrive in the dry climate, which averages only 13 inches of rain per year, and from grazing by bison, elk, and pronghorn.

The two dominant trees in the mountain forest ecosystem are Douglas-fir and ponderosa pine. The trees are an important food source for nonmigratory birds such as jays, chickadees, and woodpeckers, and they provide cover for elk and other wildlife.

Highly rich in insect life, the refuge's wetlands are a smorgasbord for ducks, sandhill cranes, and other birds, and they provide essential habitat for beavers, muskrats, mink, and other furbearing mammals.

DON AND MJ JONES.COM

**A SECRET NO MORE** Once visited mainly by local and Missoula-area residents, the refuge has become more widely known in recent years. Among the refuge activities and features (from above): bird watching workshops, visitor center, annual fall bison roundup (see "If you go" below), and driving tours.

Streamside thickets are places of heavy vegetation along Pauline Creek, Mission Creek, and the Jocko River. These dense jungles of riparian willow and other trees, shrubs, and grasses provide excellent protective cover and a wide variety of food for deer, bears, beavers, and other species.

Look for all four ecosystems along Red Sleep Mountain Drive, which begins by ascending 2,000 feet along steep switchbacks to pine-covered hills. You'll also see the breathtaking vistas of the Mission Valley, bounded on the west by the Flathead River and on the east by the Mission Mountains. At the drive's 4,700-foot-high summit, look for the display that describes how historic Lake Missoula, born during the last ice age, once filled the valley floor.

After topping the high, cool hills, the drive drops back to the warm, rolling prairie, where bison raise dust clouds in wallows. Farther on, watch for mule deer peeking from willows lining the banks of Mission Creek. Near the end of the drive, consider relaxing in the shady picnic ground bordering the creek before returning to the start at the visitor center.

And always remember, whenever you see a bison—which you undoubtedly will—keep an eye on its tail.

EDITOR'S NOTE: *The U.S. Fish and Wildlife Service and the Confederated Salish and Kootenai Tribes recently announced an agreement in which tribal members will perform certain activities at the National Bison Range in 2005 and 2006. The agreement comes after ten years of negotiations between the tribes and the U.S. government.*

*Under the Indian Self-Determination and Education Assistance Act, qualified tribes can petition to perform activities administered by the Department of the Interior (which oversees the USFWS) that "are of geographic, historic, or cultural significance to the requesting tribe."*

*Tribal members will conduct bird population monitoring, invasive weed control, prescribed prairie burning, and other management activities.*

*Due to public controversy over the agreement, Montana Senator Conrad Burns has promised to hold a congressional hearing later this year to evaluate its progress.*

DEA VOGEL



NEAL AND MJ MISHLER

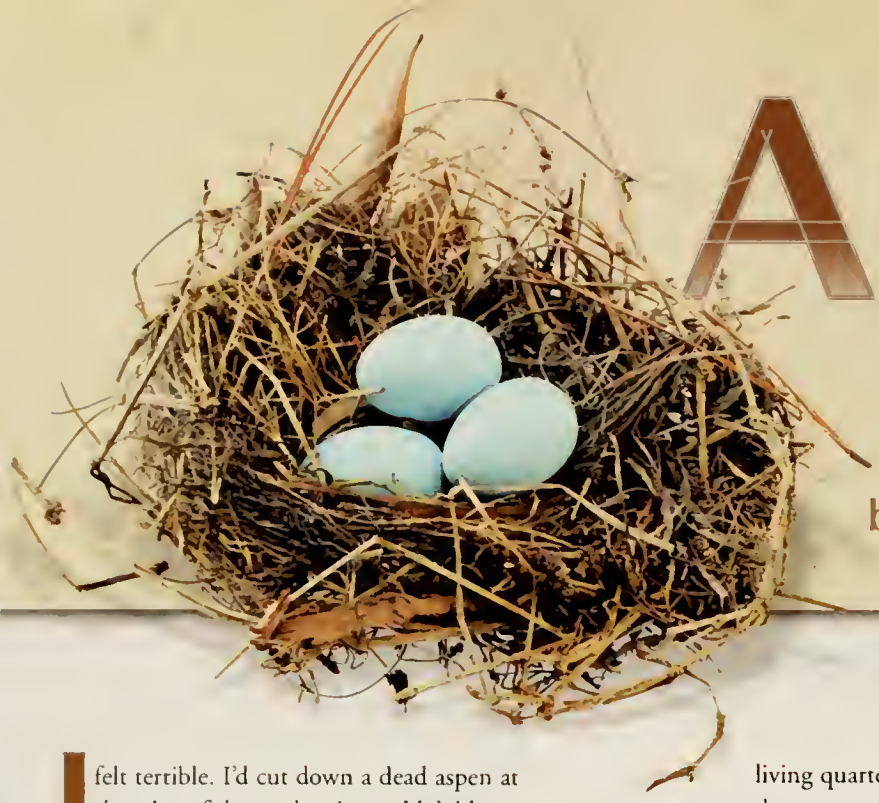
JEFFRICHPHOTO.COM

## If you go

**Directions:** Take U.S. Highway 93 north from Missoula to Ravalli. Turn west on Montana Highway 200. Continue west to Dixon, then turn north on County Road 212 to Moiese, where you'll find the range entrance.

**Open:** The range is open year-round, but hours vary depending on the time of year. Call ahead at (406) 644-2211.

**Fall roundup:** In early October, cowboys herd the refuge bison into large corrals, creating a scene right out of a Western movie. Veterinarians check bison health and refuge staff brand calves to identify the animals' age. The roundup is open to the public.



# Animal

## From insulated dens to insecticidal nests, wildlife build some amazing structures

I felt terrible. I'd cut down a dead aspen at the edge of the yard so it wouldn't blow over and clobber the dog or one of our kids. But in sawing it down, I'd inadvertently killed a family of four. Peering into the silver dollar–sized hole, I could see the broken shells and their scrambled contents mixed with wood chips and downy feathers. A woodpecker had gone to great lengths to chisel out the 3- by 7-inch cavity for the purpose of raising young and protecting them from predators and the weather. By not checking the tree carefully, I had put an end to all that.

The incident made me think of the many other nests, burrows, and dens our land has housed during the 30-plus years we've lived in South Cottonwood Canyon, near Bozeman. Several years ago, a hummingbird stitched together a diminutive nest of lichen and seedpod on a decorative metal sculpture hanging from our porch. She hatched and raised two babies there. Water ouzels have maintained the same mossy nest for two decades under the footbridge crossing the creek near our house. When I replaced the bridge several years ago, I moved the nest to a perch under the new bridge. The ouzels have renovated their old home into a basketball-sized dome with a side entrance leading into a soft chamber for laying eggs and raising young.

Elsewhere on our property, ants have mounded huge hills, voles have tunneled living quarters underground, paper wasps have fashioned intricate hanging homes in trees, foxes have dug dens, and beavers have engineered dams and constructed lodges in the creek. Observing various creatures' diverse architectural ingenuity has taught me much about their lifestyles.

Animals build homes for the same reasons people do: protection from predators, shelter from weather, and sanctuary for raising offspring. And, as is the case for us, building a home isn't cheap. For wildlife, the cost comes in expending time and energy. For example, a bird may make 1,000 or more trips to transport twigs, grasses, and other nest-building materials.

Some animals, like moose and elk, are so big they don't need a home to protect them from predators. Others, like robins and wolves, build nests or dens only as a place to raise their initially helpless young. Still others, such as bears, construct rudimentary homes in which they spend only the winter sleeping and giving birth.

MICHAEL AND PATSY FRIBLEY

**SILK CIRCLE** A spider spins grass heads into a circular home and insect trap.

Other animals may spend their entire lives in their constructions. Moles excavate nest chambers and intricate tunnels where they hunt, sleep, and raise their families.

Just as humans build homes out of everything from brick to straw, animal architects use all sorts of different building materials. The strings, leaves, twigs, and pebbles that birds use to fashion nests act both as structural support and camouflage. Animals may also use fur and feathers, from their own bodies or shed from others, to add insulation to their homes. Bird nests have been found with snakeskins woven into their fabric. Researchers theorize the skins may help frighten predators.

Other materials used in nests help repel pests. Zoologist Dr. Michael H. Hansell writes in *Animal Behavior* that some birds, including Harris's hawks and bald eagles, "bring fresh plant material with insecticidal properties to the nest. One herb used by the starling is *Erigeron*, known as fleabane (the flea killer)."

Other birds are less discerning about building materials and gather anything that's easily obtainable around their building site. According to David Hancocks, who wrote *Master Builders of the Animal World*, a Californian "recorded the contents of an osprey nest built in his garden, which

# Architecture

## By Sam Curtis

included three shirts, a bath towel, one arrow, and his own garden rake."

Though big, osprey nests are nothing compared to those of bald eagles, which can be as large as a Volkswagen Beetle and weigh a ton or more.

Robins and many other birds use mud as a mortar to cement grasses and mold the nest cups. Birds also gather silk produced by insects and spiders and use it to fasten nesting materials. Paper wasps collect dried wood fibers from dead trees and old boards, and use their mandibles to ball up the fibers. The wasps then carry the sawdust spheres back to the nest site in their mouths. They drink water that they then regurgitate, along with other stomach contents, to paste the wood fibers together into a semi-waterproof nest.

Caddis fly larvae living in mountain streams build tubular living structures, like hard-sided mummy bags, that protect them against predatory fish. A caddis larva starts by weaving a silky tube around its own body with material from its salivary glands. The insect reinforces this with pieces of vegetation, twigs, or sand applied with more silk. "Each [caddis] species has a characteristic way of arranging its building materials," writes Karl von Frisch in *Animal Architecture*. "Some align little bits of broken twigs in parallel with the axis of the tube; others put them crossways; others still arrange them in spiral, or just jam them together in a haphazard way."

What tools do animal builders use to construct their homes? Usually, it's their

**HIDDEN HOUSING** The female rufous hummingbird uses spider silk to construct her tiny walnut-sized nest (shown here twice actual size) from soft plant fibers and attach it to a twig. She then sticks bits of moss and lichen to the outside to camouflage the nest from predators. Photo by Alan G. Nelson.

MASLOWSKI PHOTO

TIM CADY

GARY LEPPART

**DOWN HOME** Many animals build their homes below ground (or water) for safety. From left: A mink and her kits den in a tree stump hollow; beavers stay secure in their underwater lodge; a burrowing owl waits for prairie dogs to vacate their burrow so it can move in.

beaks, jaws, feet, claws, wings, and other body parts. A warbler uses its whole body to mold the symmetrical cup of its nest. Gathering sprigs of grass and stems in its beak, the bird clumps the materials into the fork of a tree branch and then rotates its entire body, using its legs and chest to push against the developing sides of the nest and uniformly compact them into a cup. Sitting in the nest, the warbler then uses its beak to twine pieces of grass together for more structural integrity.

"To make the rim of the nest strong and smooth, the bird often collects the fine threads of spiders' silk," writes von Frisch. "When it returns with the spiders' webs, it first brushes them off its beak onto twigs where they attach themselves. They can then be drawn out to fine threads that are shuttled back and forth across the rim, firming the structure."

Animals that gather mud for building their homes face the problem of the material drying out between applications, causing cracks and improper molding. "Some mud-daubing wasps overcome this by making a buzzing noise (with their wings) as they spread a fresh load of mud," writes Hansell. "This temporarily liquifies the mud, allowing tiny air bubbles to escape and the new load to weld firmly onto the existing structure."

Design, of course, is the essence of architecture. Animal architects, demonstrating Frank Lloyd Wright's dictum that form follows function, create extremely efficient designs that reflect how effectively the structure fulfills their purpose.

The nest of the red wood ant, for example, begins as worker ants hollow out cavities in the dead wood of an old stump and connect them with tunnels. Other workers then bring bits of grass, twigs, moss, and needles to the site and mold them up and over the stump while more workers dig passageways underground to a depth that may equal the mound's height.

"Smaller particles are used to ensure a dense surface and to line the inside of the various chambers and connecting passages," writes von Frisch. "The surface has a great number of holes that serve as entrances. Their numbers and position is often changed. At night and on cold days the

*Freelance writer Sam Curtis lives in Bozeman.*

**LET'S LIVE...HERE** Birds will build almost anywhere. From left: A red-necked grebe constructs a nest of mud and aquatic plant material on the water's surface; a blackbird nests in the red light district; amazingly secured to a cliff, a golden eagle nest stretches 20 feet from top to bottom.

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DANIEL D. LAMOREUX

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MICHAEL J. WOLF

**MATERIAL WORLD** Wildlife use all types of natural matter to build their homes. From left: Cliff swallows use mud to construct their nests; an ant excavates wood from a rotting stump; a golden-mantled ground squirrel gathers grasses to line its nest.

ants plug them with nesting material just as we close our windows to keep heat in."

The anthill is an ever-changing architectural structure. Over a period of three or four weeks, workers constantly bring bits of building material from the depths of the nest to the surface, causing the original surface layer to gravitate to the center. Once all these particles reach the center of the nest, they are then carried back to the surface.

"This constant turnover," writes von Frisch, "causes the material from the humid interior to be regularly dried on the surface, and this helps to prevent mold formation."

Big pieces of material that are difficult to transport remain in the center to form the sturdy core of the nest. Fine material is packed down on the surface as insulation and waterproofing, and the entire hill is molded to an angle that will efficiently catch the low rays of the sun to warm the nest in the morning and evening.

Montana's greatest architectural master may be the beaver. Using their large, sharp incisors, these rodents cut down trees and trim branches to produce timbers they drag to a creek bottom. The logs, along with cross pieces, create a support structure against the water current. From there, beavers continue to build up, until they have blocked the stream to create a deep pond. Beavers design their lodges with complex heating, ventilation, and air-conditioning systems based on the position of air openings. Some beaver dams stretch 1,000 feet or more across. The dams can create ponds larger than a football field and are strong enough to support a person riding across on horseback.

Humans have long studied animal architects and marveled at both the simplicity and complexity of natural design. For inspiration, modern architects are looking to the homes and other structures created by wildlife. Their goal, in the words of renowned California architect Eugene Tsui, is to look at humanity and nature "as design partners," based upon the fact "that nature is the supreme architect and designer of all living things."

That's quite a compliment for an ordinary beaver lodge, ant mound, or bird's nest. But as Tsui notes, nature "has had five billion years time to practice, to evolve and perfect its designs." By comparison human architecture, even that of the ancient Egyptians, is just getting off the ground.

**CRAWLING HOME** The architecture of spiders and insects is some of the most ingenious in the animal world. From left: A spider web is unmatched for melding strength and lightness; paper wasps build a honeycomb structure; only tent caterpillars could find this silken glob comfy.

GARY LEPPART

DRAKE BARTON

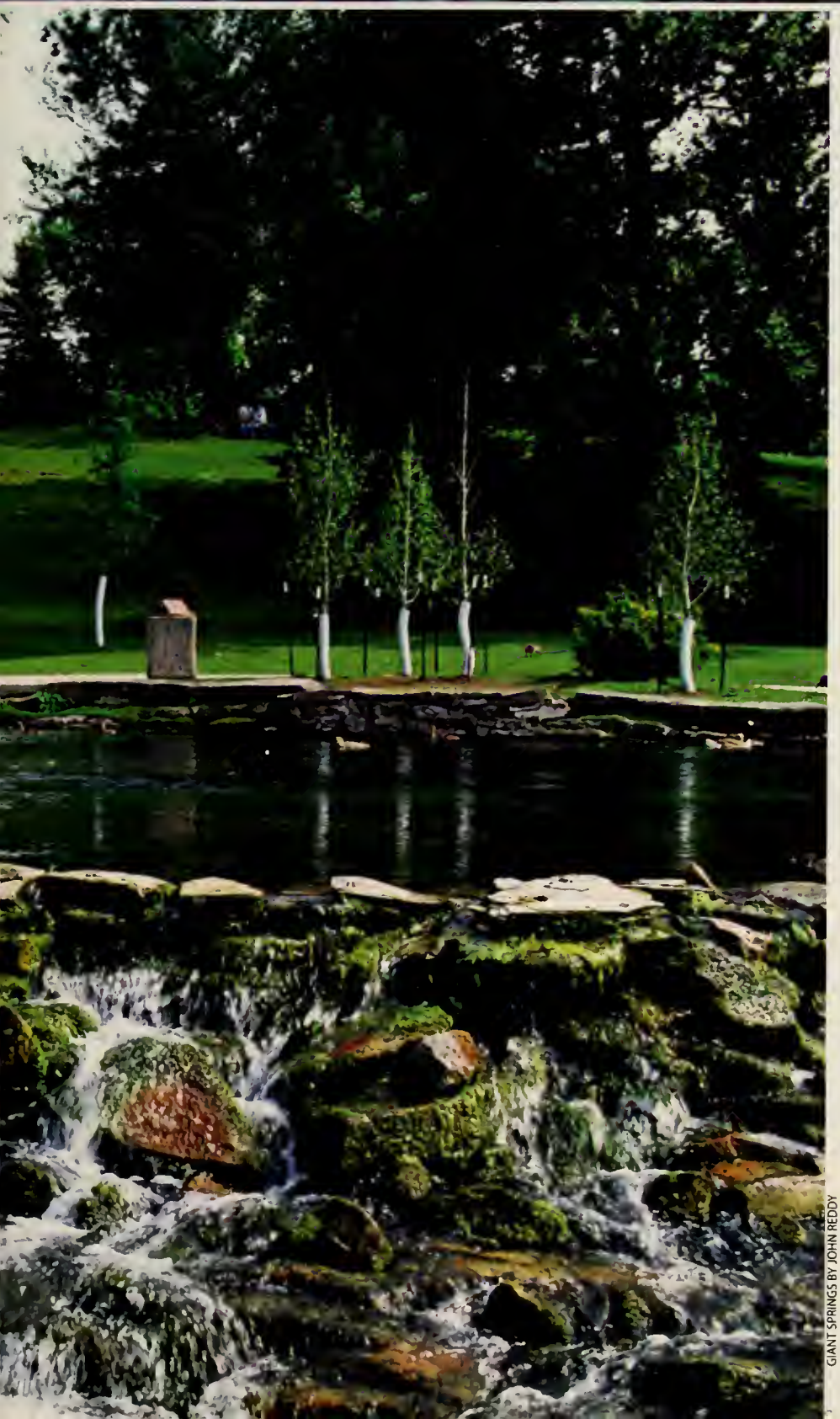
NELSON KENTER

STATE PARKS PORTRAIT

GIANT SPRINGS HERITAGE

# GUSHING OVER

# GIANT SPRINGS



GIANT SPRINGS BY JOHN REDDY

## What with the fishing, Lewis and Clark history, riverside trails, hatchery tours, picnicking, and more, it's hard to keep the great features of this state park bottled up

**By Bruce Auchly**

For Gerald Kundey, the past 25 years of visiting Giant Springs Heritage State Park are all about fishing.

"I fish the Missouri River every day," says the 69-year-old Great Falls resident, one of the park's most regular visitors. "An hour in the morning and an hour in the afternoon, if it isn't too cold."

Kundey is one of the roughly 160,000 people who visit Giant Springs each year. The springs and their namesake park are just a few miles downstream from Great Falls, on the banks of the Missouri River. Although Kundey and his friends come for the trout fishing, the park attracts other visitors with group picnic grounds, an adjoining state fish hatchery, natural and human history interpretive tours, historic sites, and, of course, the springs themselves, Montana's largest.

This summer, thousands of visitors from across the United States will follow the Lewis and Clark Trail to Giant Springs. There they will find one of Montana's premier state parks and learn that there's much more to this riverside oasis than meets the eye.

### Both sides of the Missouri

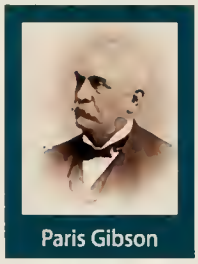
Established as a Montana state park in the mid-1970s, Giant Springs encompasses slightly over 3,000 acres, about 90 percent of which is on the north shore of the Missouri. Most of the north parcel is an open

space conservation easement. On the river's south shore, where FWP manages nearly 400 acres, is the area most people associate with Giant Springs Heritage State Park. This is the main place for sightseeing, fishing, bird watching, picnicking, or just loafing on a summer day. And at the center of it are the springs.

Bubbling up alongside the Missouri River, Giant Springs has probably existed since the last ice age. The springs are a terminal point of the Madison aquifer, which begins about 75 miles south in the Little Belt Mountains. At times the aquifer drops to 600 feet deep before popping to the surface at several spots near Great Falls. The largest of these is Giant Springs, which each day gushes 156 million gallons of water.

Visited by Indians for centuries, the springs were given their first written description in July 1805 by Captain William Clark, who called them "the largest fountain or Spring I ever Saw," adding that the clear spring water "boils up from under the rocks near the edge of the river."

The springs were more or less ignored until 1884, when the city of Great Falls was founded. The bubbling oasis became a popular spot for locals on Sunday afternoons. City founder Paris Gibson, sensing the great recreational potential of the site, began a program of shading the prairie area by planting several hundred cottonwood and box elder trees.



Paris Gibson

Though Great Falls residents knew about the springs, out-of-towners usually discovered the area only by accident.

"Nobody tells you about it; you run across it by chance," wrote John Neihardt in *The River and I*, published in 1910. "Down East they would have a great white sprawling hotel built close by it wherein one could drink spring water....But nobody seems to care much about so small an ooze out there [in Montana]: everything else is so big."

*Bruce Auchly is an FWP regional information officer at Great Falls.*

HISTORICAL PHOTOS COURTESY OF CASCADE COUNTY HISTORICAL SOCIETY

## Cool, clear water

So bountiful is the output of Giant Springs that the 58 feet from the springs to the Missouri is considered one of the two shortest rivers in the world and is officially called the North Fork Roe River.

The water is also exceptionally clean and clear. "I could have Seen to the bottom of the fountain to pick up a pin," wrote Sergeant John Ordway of the Corps of Discovery in 1805.

The pure and plentiful spring water has long been eyed by businesses interested in putting it to commercial use. In 1993, Montana Giant Springs began leasing more than 200 million gallons each year to bottle as drinking water at a nearby plant. Recently, a malting company began construction on a $70 million plant that will lease water from the spring for use in its malting process. Both operations have undergone environmental assessments and been approved by the Montana Fish, Wildlife & Parks Commission.

No such review was given to the highly toxic silver smelter built in 1888 by the Montana Smelting and Refining Company. The smelter, which used water from Giant Springs, consisted of roughly 75 buildings, from blast furnaces to worker residences. It was the first major industry in newly formed Great Falls, and hopes ran high as it began operation. But after just 14 years the smelter closed, mostly due to plummeting silver prices and a shortage of ore that made the operation unprofitable. By 1928, the city had torn down the decrepit buildings, which had become an eyesore.

Though only a few crumbling smokestack remnants of the smelter remain visible, the plant left a huge and toxic underground legacy for more than a century. In 2002, the Montana Department of Environmental Quality (DEQ) discovered abnormally high levels of contamination in the soil at the park. The toxins were in slag flue dust and contaminated bricks left from the abandoned silver smelting operation.

"We found metals, lead, and arsenic concentrations that caused us to be concerned," says John Koerth, who supervises the DEQ's Abandoned Mine Section. "There was potential there for a public health problem."

Fortunately, contamination was only found in the soil on the site and not in the spring water. However, the soil had to be removed. Concerned about park disruption, particularly with the approaching Lewis and Clark Bicentennial, FWP and DEQ worked out an accelerated cleanup plan to remove contaminated soil, haul it to a landfill, and replace it with clean soil and fresh landscaping.

Cleanup of the contaminated parcels

PHIL FARNES

STEVEN AGEE

**THROUGH THE YEARS** People have been drawn to Giant Springs for centuries. Indians first discovered the site, and later the Corps of Discovery visited what Captain Clark called "the largest fountain or Spring I ever Saw." Clockwise from far left: the ill-fated silver smelter; Great Falls visitors in the 1890s; stonework creating the aquamarine pool; the spring flowing into the Missouri; trees and other landscaping at the park today.

was completed by fall 2003. The project cost of $2.1 million was paid for from a state program funded by a federal fee on coal mining.

"I was real pleased with the outcome," Koerth says. "We're confident the park is now a very safe site and will continue to be so in the future."

## Trout hatchery

The most beneficial use of the park's famous water, which is free of impurities and stays at a constant 54-degree temperature, is for rearing trout in Giant Springs Fish Hatchery, located within the park. Built in 1922, the hatchery produces roughly 1.25 million fish each year, mostly rainbow trout and some Chinook salmon. FWP stocks the fish in lakes and reservoirs throughout Montana as well as in the Missouri River along the park for Kundey and other anglers to catch.

According to Bruce Chaney, hatchery manager, the fish are first reared in 41 indoor fiberglass troughs, then are raised to stocking size in 24 outdoor concrete raceways. A show pond allows visitors to view and feed large fish. The facility also has residences for hatchery workers and their families along with a garage and a workshop.

Giant Springs is the only Montana state hatchery inside a state park. That means lots of people—creating both a challenge and an opportunity for hatchery workers. On some summer days, when the state park and hatchery are full of visitors, the staff has its hands full keeping visitors away from the fish.

"We get people taking fish out of the river and putting them into the raceways, people trying to catch fish in the raceways, people stealing fish, people trying to grab fish, you name it," Chaney says.

But the hatchery staff also recognizes the advantage of such intense public interest. Fish culturalist Mark Gaub says dozens of school groups come through the hatchery each year. "When they're here, the students learn about water chemistry and biology and how we transport these fish to other parts of Montana," he says. "One thing we always tell them is that if they want to be a fish culturalist or work at other jobs in FWP, they need to stay in school and study math and science and English."

## Park improvements

The site of Giant Springs Heritage State Park was originally owned by Montana Power Company, which acquired the property as it went about the business of building the nearby Black Eagle and Rainbow hydroelectric dams on the Missouri River. In 1920, Montana Power leased 2 acres to the state of Montana and leased the springs and 14 surrounding acres to the city of Great Falls, which established a city park there.

Little changed at the site until the mid-1970s, when the city turned the park over to the state (while retaining some water rights to the springs). Montana Fish and Game, as the department was called then, immediately embarked on major renovations. It built a new, mile-long entrance road, turned the old entrance road into a pedestrian path along the river, and put in a hatchery visitor center, restrooms, and a concession stand. The department also seeded lawn, planted trees, and installed playground equipment.

In the 1980s, FWP acquired additional land south of the springs and entrance road for group activities and renamed the park Giant Springs Heritage State Park. That's also when the department's regional headquarters moved into the park.

Improvements to the area have continued. One exciting new addition has been the city's paved 28-mile River's Edge Trail, which traverses the park on both sides of the river and allows safe and scenic hiking and cycling access from downtown Great Falls. To the delight of year-round visitors like Kundey, FWP built heated, handicapped-accessible restrooms for the public.

"When they changed from an outhouse

CRAIG & LIZ LARCOM

to an inside bathroom, that was a real plus," Kundey says.

## Lewis and Clark Center

The area's biggest development has been the $6 million Lewis and Clark National Historic Trail Interpretive Center, built in 1998 along the river just a mile west of Giant Springs Heritage State Park. The center's main theme is Lewis and Clark's relationship with American Indians, such as the explorers' winter with the Mandans, their search for Sacagawea's Shoshone people, and how the Nez Perce provided food and shelter during several crucial months of the expedition.

The federally operated interpretive center is technically outside the park, on U.S. Forest Service land. But most visitors see the center and the state park as one entity, especially since the old county road along the Missouri has been transformed into a nature trail connecting the two sites.

Lewis and Clark are central to Giant Springs Heritage State Park, especially this year. They were the first Euro-Americans to describe the springs, and 2005 marks the bicentennial of their visit.

To commemorate the event, the National Park Service is sponsoring a moveable national display called Corps of Discovery II, which will visit Montana between May 6 and September 11, 2005. The central feature of the traveling exhibit is a 150-seat auditorium for cultural arts demonstrations, folklore, music, living history presentations, and readings from the expedition journals.

The traveling exhibit will be at Giant Springs Heritage State Park June 25 through July 4, the same time, 200 years before, when the expedition portaged around the Great Falls of the Missouri.

No one knows for sure how many Lewis and Clark buffs will visit Giant Springs Heritage State Park this year. Great Falls businesses are hoping for tens of thousands. But no matter how many new visitors arrive, regulars like Gerald Kundey don't anticipate many problems.

"I don't care," says Kundey of the anticipated surge in visitors. "As long as they don't bother the fish."

**THE MISSOURI RIVER RUNS THROUGH IT**

Most of the park is on the north shore, including Sulfur Springs, the waters of which were said to have saved the life of Sacagawea when she was feverish in June 1805. It's the south shore, however, that holds most of the park's main attractions, including the primary state park facilities (above), the River's Edge Trail (right), and the fish hatchery (lower right).

CRAIG & LIZ LARCOM

GEORGE WUERTHNER

*Throughout the summer, Giant Springs Heritage State Park offers interpretive walks and programs on wildlife, natural history, American Indians, the Corps of Discovery, trading routes, the Great Falls, and more. For information, call (406) 454-5858.*

*To learn more about the National Park Service's Corps of Discovery II traveling exhibit, including a schedule of other Montana stops, see page 4 of this issue.*

# Gray Jay

*(Perisoreus canadensis)*

**BY JOHN FRALEY**

When I think of gray jays, also known as camp robbers, I think of wilderness. While hiking mountain forests and ridges in summer, I see these quirky, medium-sized birds all the way up to the tree line. In winter, they often keep me company while hunting or cross-country skiing in the backcountry.

Though gray jays embody wilderness, they can be surprisingly tame. Montana mountain hikers, campers, and other travelers are familiar with the bird's habit of boldly panhandling for food, going so far as to fly into camp and grab items off plates. Feeding any wild animal is not a good idea, but with gray jays it can be almost impossible to keep these "robbers" away from your lunch.

NEAL AND ALI MISHLER

**APPEARANCE** The gray jay is a member of the family Corvidae, which includes jays, crows, ravens, and magpies. Handsome with fluffy plumage, the gray jay looks like an overgrown chickadee. It averages about 10 to 12 inches long and has a wingspan of 18 inches. The bill is short and black, while the back and head are gray. The white underside extends across the throat and down the breast to the tail area (though in western Montana, the jay's underside is often light gray, not white).

Other identifiable characteristics are its short, gray wings, black eyes and legs, and gray tail feathers tipped with white.

**MORE ABOUT FOOD** This bird is truly omnivorous, eating everything from live beetles to dead deer. Gray jays consume berries and a variety of insects, notably grasshoppers, caterpillars, bees, and wasps. During winter, they eat lichens, as well as carrion and even the occasional small, live rodent.

Montana Fish, Wildlife & Parks biologist Dwight Bergeron, a bird expert, has observed family groups of 30 or more gray jays hunting along forest edges like a roving pack of miniature, airborne wolves. During spring and early summer, says Bergeron, gray jays sometimes snatch young birds right from the nest.

Like many animals that live in Montana year-round, the gray jay caches food for winter consumption. But unlike any other species, the gray jay hides clumps of berries and other edibles by sticking them to the undersides of tree branches or in holes in dead trees. It does this using a sticky mucous secreted from the side of its beak. Scientists believe this trait enables the gray jay (whose genus name *Perisoreus* means "hoarder") to survive in the high country during winter.

**SOUND** The most commonly heard of the gray jay's mostly mellow sounds include the clucking *ca, ca, ca*, and a soft whistle. When alarmed, the jay emits a screeching *jaaaay* call.

**REPRODUCTION** Gray jays breed in coniferous forests. After choosing a nest site in a tree up to 30 feet high, the male starts building the nest using twigs, grass, bark, and moss. The female then joins him to complete the nest, which she lines with feathers and other soft materials. Gray jays will breed from March through May. The female lays three to four eggs and incubates them for two to three weeks. The young, which are fed by both the male and the female, can fly after roughly four weeks.

**HABITAT** Gray jays live almost exclusively in remote coniferous forests and venture into high country containing scattered snags or conifers. Though they act tame around humans, gray jays stay away from towns, ranches, and other settlements. Like magpies, chickadees, and a few other hardy bird species, they do not migrate.

**STATUS** Gray jays are common throughout their range, which extends along the Rocky Mountains from Alaska south to northern New Mexico, Arizona, and California. A breeding bird survey conducted across the West from the mid-1980s to the mid-1990s showed the birds were increasing in number, but no one is sure why.

In Montana, gray jays are common in forested mountains. Bergeron says recent breeding bird surveys show that their populations have been stable to slightly increasing over the last ten years.

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*John Fraley is an FWP regional information officer in Kalispell.*

## PENTHOUSE SUITE

A golden eagle nest weighing several hundred pounds sits atop a sandstone column south of Dillon. Along the sides of the rock structure, cliff swallows find ideal sites for their mud nests. See more amazing wildlife dwellings beginning on page 28.
Photo by John Lambing.

Montana Outdoors May-June 2005
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